

# Questions on lesson one



Questions signed by have been taken from the school book.

## 1. Choose the correct answer :

- The most common simple machines are ..... (El-Menofia 2016)  
a. levers.      b. bicycles.      c. car machines.      d. (a), (b) and (c).
  - The lever rotates around a fixed point called .....  
a. resistance force.      b. fulcrum.  
c. effort force.      d. a rigid bar.
  - Levers were first described in 260 B.C by the Greek scientist .....  
a. Archimedes.      b. El-Hassan Ibn El-Haitham.  
c. Newton.      d. Mendel.
  - ..... is a rigid bar that rotates around fulcrum, and is affected by an effort force and a resistance force.  
a. Lever      b. Solution      c. Mixture      d. Friction force
  - The ..... force is exerted by a person to equilibrate the resistance.  
a. fulcrum      b. effort      c. friction      d. (a) and (b)
  - Any lever consists of .....  
a. a resistance force (R).      b. an effort force (F).  
c. a fulcrum (O).      d. (a) , (b) and (c).
  - All the following are from the importance of levers except .....  
a. increasing speed.      b. increasing force.  
c. increasing size.      d. accuracy in performance.
- (Sohag 2016)
- ..... is a lever that uses a small force to make a great effort.  
a. Crowbar      b. Hockey bat      c. Ice holder      d. Manual broom
  - ..... increases the speed of objects that we affect them.  
a. Manual broom      b. Seesaw  
c. Hockey bat      d. Coal holder
  - Tweezers are used to .....  
a. move a heavy load.      b. increase the speed of the ball.  
c. pick up very small objects.      d. hold the cold materials.
  - Which of the following levers is used to avoid dangers ? .....  
a. Coal holder.      b. Scissors.      c. Seesaw.      d. Manual broom.



12. Which of the levers derived is used to enlarge the distance ? .....  
 a. The tweezer. b. Crowbar. c. The broom. d. Coal holder.
13. Which of the following levers moves force from one place to another ? .....  
 a. Wheelbarrow. b. Nutcracker.  
 c. Manual broom. d. Pincers.
14. The opposite figure represents the ..... lever.  
 a. first class  
 b. second class  
 c. third class  
 d. fourth class
15. The levers that have the fixed point (fulcrum) between the resistance force and effort force are .....  
 a. first class levers. b. third class levers.  
 c. second class levers. d. fourth class levers.
16. From the first class levers is ..... (Beheira & El-Gharbia 2016)  
 a. nutcracker. b. sweet holder. c. scissors. d. manual broom.
17. .... have the resistance force between the effort force and fulcrum.  
 a. Third class levers b. First class levers  
 c. Second class levers d. (a) , (b) and (c) (Cairo 2017)
18. Soda water opener is a .....  
 a. first class lever. b. second class lever.  
 c. fourth class lever. d. third class lever.
19. The 1<sup>st</sup> class lever differs from the 2<sup>nd</sup> class lever in .....  
 a. the absence of the effort force. b. the presence of a fixed point.  
 c. the position of fulcrum. d. (a) and (b).
20. Which of the following figures represents the third class lever ? .....





## Unit One

21. .... are from the second class levers. (Aswan 2015)  
 a. Nutcracker, wheelbarrow and bottle opener  
 b. Sweet holder, wheelbarrow and soda water opener  
 c. Tweezers, hockey bat and manual broom  
 d. Paddle, pincers and scissors
22. Which of the following is a 2<sup>nd</sup> class lever ? ..... (Qena & Beheira 2015)  
 a. Sweet holder. b. Wheelbarrow. c. Seesaw. d. Hockey bat.
23. .... have the effort force between the resistance force and fulcrum.  
 a. Third class levers b. First class levers  
 c. Second class levers d. (b) and (c)
24. The effort force is between the resistance and fulcrum in .....  
 a. nutcracker. b. scissors. c. sweet holder. d. crowbar. (Fayoum 2017)
25. .... is a lever from the 3<sup>rd</sup> order. (Ismailia & Matrouh 2017)  
 a. Sweet holder b. Scissors c. Nutcracker d. Nail clippers
26. All the following are from the 3<sup>rd</sup> class levers except .....  
 a. wheelbarrow. b. fishing tool.  
 c. manual broom. d. sweet holder. (Dakahlia 2017)
27. Wheelbarrow is considered from ..... class levers. (South Sinai & Gharbia 2015)  
 a. first b. second c. third d. fourth
28. All the following are from the first class levers except ..... (Ismailia 2015)  
 a. the crowbar. b. the scissors. c. nutcrackers. d. the seesaw.
29. Crowbar is considered from ..... class levers. (Alex. 2016)  
 a. first b. second c. third d. fourth

## 2. Choose from column (B) what suits in column (A) :

(A)	(B)
1. Lever.	a. A force that is applied by a person to overcome the resistance.
2. Third class levers.	b. They have the resistance between effort force and fulcrum.
3. Fulcrum.	c. A fixed point at which the lever rotates.
4. First class levers.	d. A rigid bar rotates around a fixed point and is affected by an effort force (F) and a resistance (R).
5. Second class levers.	e. They have the fulcrum between the resistance and effort force.
6. Effort force.	f. They have the effort force between (O) and (R).

1. .... 2. .... 3. .... 4. .... 5. .... 6. ....



3. Put (✓) in front of the right statement and (✗) in front of the wrong one, then correct it :

1. The levers are considered as one of the first simple machines which man invented in the past. (Ismailia 2015) ( )
2. The lever is a rigid bar that rotates around a fixed point called resistance. ( )
3. Any lever consists of a resistance force and an effort force only. ( )
4. The effort force is a force that is exerted by a person to equilibrate the resistance. ( )
5. The crowbar is an increasing force lever. ( )
6. Levers make tasks easier. ( )
7. Wheelbarrow and nutcracker save the exerted effort. ( )
8. Water pump is a kind of levers which pick up the very small objects. ( )
9. Levers were first described by the Greek scientist Archimedes. ( )
10. In the first class levers, the resistance is between the effort force and fulcrum. (Kafr El-Sheikh 2017) ( )
11. From the functions of levers is to increase the force. (Giza 2016) ( )
12. Among the functions of levers is to decrease the distance. (Cairo 2016) ( )
13. From the functions of levers is to decrease the speed. (Cairo 2017) ( )
14. The fulcrum in scissors lies between force and resistance. ( )
15. The crowbar is an example of the first class levers. (Menofia 2015) ( )
16. In the 2<sup>nd</sup> class levers, the resistance is between the effort force and fulcrum. (Dakahlia & Ismailia 2017) ( )
17. The third class levers are the most popular type of levers. ( )
18. Pliers are composed of three first class levers. ( )
19. Nail clippers have fulcrum between the effort force and the resistance force. ( )
20. The third class levers have fulcrum between the effort force and resistance. (Menofia 2015) ( )
21. Stapler, bottle opener and hammer claw are examples of third class levers. ( )
22. In hockey bat, the effort force is between the resistance force and fulcrum, so it is a first class lever. ( )
23. The second class levers have the effort force between the resistance and fulcrum. ( )



## Unit One

24. The fulcrum of any lever is always between force and resistance.

(Qena 2016) ( )

25. The nutcracker is considered as a first class lever.

( )


26. Soda water opener is a second class lever, while the fishing tool is a first class lever.

( )

#### 4. Write the scientific term of each of the following :

1.  The fixed point of a rigid bar on which the bar rotates.


(Aswan 2017) (.....)

2.  A rigid bar that rotates around a fixed point, and is affected by an effort force and a resistance force.

(Cairo & Damietta 2017) (.....)

3. A force that is resulted from the body that we want to move it. (.....)

4. A force that is exerted by a person to equilibrate the resistance force. (.....)


5.  Levers that have the fixed point between the effort force and the resistance force.

(Suez & The New valley 2017) (.....)

6. The most popular type of levers in our daily life. (.....)

7.  Levers that have the resistance between the effort force and the fixed point.

(Fayoum 2017) (.....)

8.  Levers that have the effort force between the resistance and the fixed point.

(Alex. & El-Menofia 2017) (.....)

9. The type of levers that its mid point is the effort force. (.....)

10. Levers that have fulcrum between resistance (R) and effort force (F). (.....)

#### 5. Complete the following statements :

1. A simple machine consists of a bar that makes the tasks be performed more easily is called .....

2. .... is considered as one of the first simple machines which were invented in the past.

3. Levers were first described in 260 B.C by the Greek scientist .....

4. The lever is a ..... that rotates around a fixed point called fulcrum.








(Suez 2017)

5. The lever is a rigid bar that rotates around a fixed point, and is affected by ..... and .....

6. Any lever consists of ..... , ..... and .....

7. .... is resulted from the body that we want to move.



8. .... is exerted by a person to equilibrate the resistance force.
9. The fixed point, where the rigid bar rotates on is called .....
10.  Levers which make tasks perform more easily by means of .....,  
..... or .....
11. ...., ..... and ..... are from the importance of levers.
12. ...., ..... and bottle opener save the exerted effort by using a small  
force to make a great effort.
13. .... is an example of levers used to increase force, while ..... is  
an example of levers used to increase the distance.
14. .... is an increasing speed lever. (El-Menofia 2017)
15. .... is a lever that moves force from one place to another place without  
bending.
16. .... is (are) very accurate lever that is used to pick up the very small  
objects.
17. .... is a lever that is used to avoid dangers. (Gharbia 2017)
18. Levers like ..... and ..... use a small effort to move a heavy load.
19. .... holder and .... holder are used to pick up the hot, cold and  
poisonous materials.
20. The types of levers are ....., ..... and .....
21. .... is the most popular type of levers in our daily life.
22.  ..... and ..... are examples of the first class levers. (Dakahlia. 2017)
23. Water pump is a ..... class lever, while ..... is a second class lever.
24. In the second class levers, the resistance is found between .....  
and ..... (Dakahlia 2015)
25.  ..... and ..... are examples of the second class levers. (Sohag 2015)
26. In the first class levers, the fulcrum is found between ..... and .....  
(Sohag & Matrouh 2017)
27. Stapler and wheelbarrow have the ..... between fulcrum and .....
28.  ..... and ..... are examples of the third class levers.
29. The effort force is between the resistance force and fulcrum in .....
30.  The nutcracker is an example of the ..... levers. (Suez 2017)
31.  The manual broom is an example of the ..... levers. (South Sinai 2017)
32.  The scissors are example of the ..... levers. (Cairo 2017)
33. The crowbar is considered a ..... class lever, while wheelbarrow is  
an example of ..... class lever. (Sohag 2016)



## Unit One

34. Sweet holder is an example of the ..... levers. (Cairo 2015)
35. Seesaw is considered a ..... class lever, while the fish hook is ..... class lever. (Giza 2017)
36. In the ..... class levers the ..... is between the fulcrum and the force of resistance. (Ismailia 2015)

### 6. Correct the underlined words :

- The most common simple machines are bicycles. (.....)
- Lever is a rigid bar that rotates around a fixed point called effort. (.....)
- The lever consists of fulcrum only. (.....)
- Fulcrum is applied by a person to equilibrate the resistance force. (.....)
- Some of the levers allow the increase in the speed of objects we inflict on as in the manual broom. (.....)
- The coal holder is used in increasing distance. (El-Menofia 2016) (.....)
- The most popular type of levers in our daily life is the second class levers. (.....)
- Seesaw, scissors and bottle opener are examples of the first class levers. (.....)
- In the first class levers, the resistance force is between fulcrum and effort force. (El-Menofia 2017) (.....)
- Tweezers, coal holder and hockey bat are examples of the first class levers. (.....)
- The fulcrum lies between the effort force and the resistance force in the third class levers. (Behiera & Port Said 2017) (.....)
- Pliers are second class levers. (.....)
- Nutcracker is from the first class levers. (Alex. & Sharkia 2017) (.....)
- In the second class levers, the effort force is between the resistance force and fulcrum. (.....)
- The crowbar is considered from the third class levers. (El-Menofia 2016) (.....)

### 7. Give reasons for the following :

- Wheelbarrow is a lever.

.....

.....

- Some levers save effort.

.....



3. Nutcracker is considered as an increasing force lever.  
.....
4. The manual broom is considered as an increasing distance lever.  
.....
5. Doctors and watch makers use tweezers as a lever.  
.....
6. Levers are very important in our daily life.  
.....
7. Crowbar, water pump and paddle are first class levers. (Alex. 2017)  
.....
8. Bottle opener and stapler are second class levers.  
.....
9. Hockey bat and fishing tool are third class levers.  
.....
10. Wheelbarrow is a second class lever, while sweet holder is a third class lever.  
.....

### 8. Choose the first class levers from the following machines :

Pincers – Tweezers – Seesaw – Wheelbarrow – Nail clippers –  
Soda water opener – Stapler – Ice holder – Hockey bat – Paddle –  
Nutcracker – Scissors – Manual broom – Hammer claw – Fishing tool.

### 9. What is meant by ... ?

1. Lever. (Port Said & Cairo 2015)  
.....
2. Effort force.  
.....
3. Fulcrum.  
.....
4. First class levers.  
.....
5. Second class levers.  
.....



## Unit One

6. Third class levers.

**10.** Mention one example of lever used for :

(Ismailia 2015)

1. Avoid dangers : .....
2. Increasing speed : .....
3. Increasing force : .....
4. Increasing distance : .....
5. Moving force from one place to another : .....
6. Accuracy in performance : .....

**11.**  Classify the following machines according to the type of lever :



(1) .....



(2) .....



(3) .....



(4) .....



(5) .....



(6) .....

**12.** How to determine the type of lever ?

.....  
.....

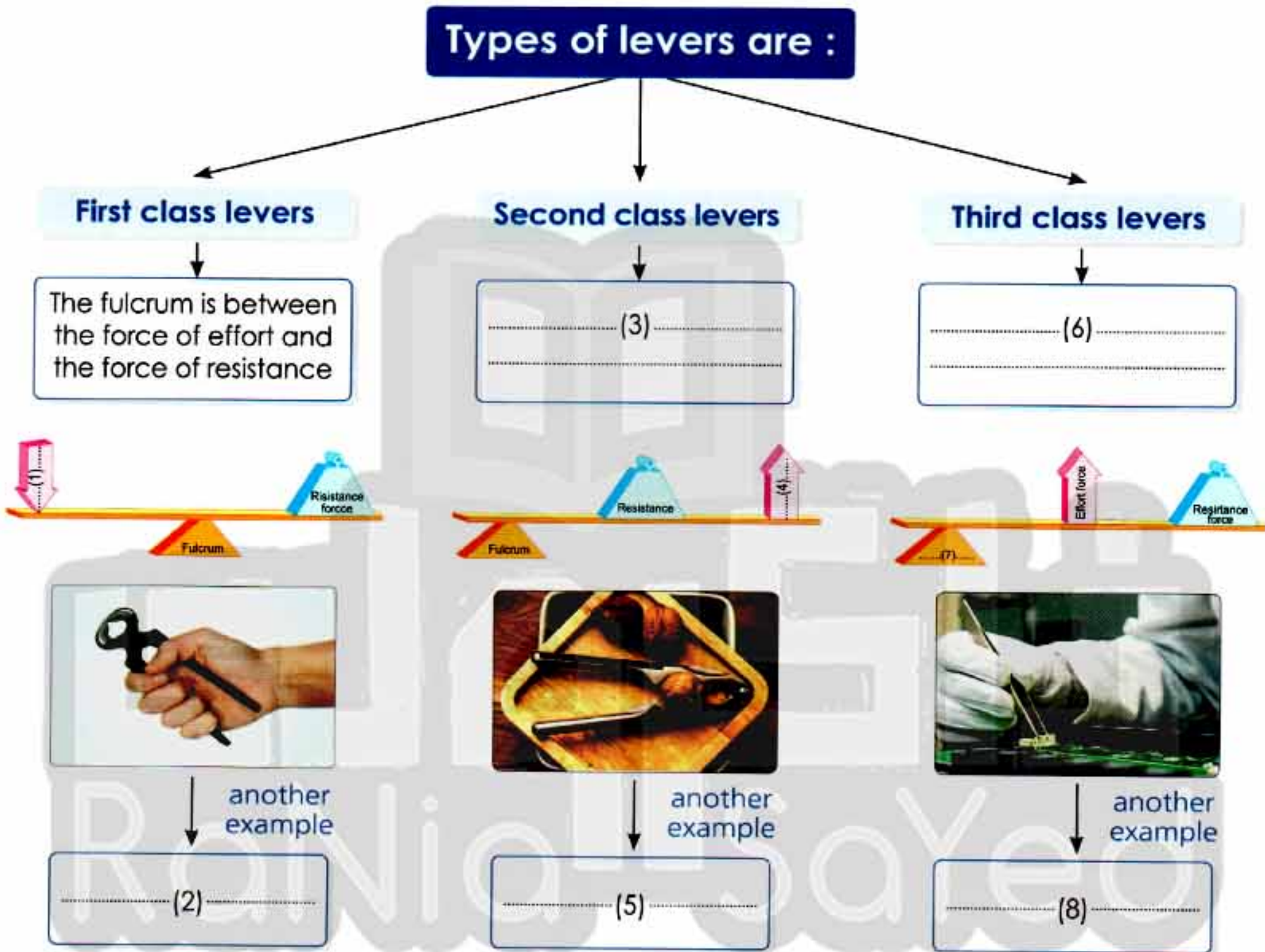
**13.** Compare between the three types of levers according to the location of fulcrum, resistance and effort force giving examples for each type. (Damietta 2016)

.....  
.....  
.....



14. What would happen if we didn't have levers ?

15. Complete the following diagram :





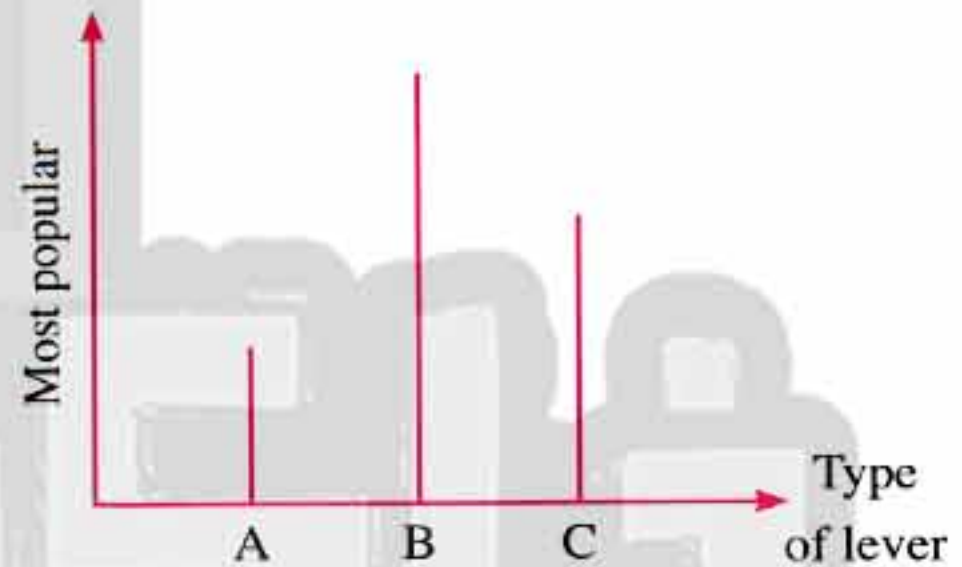
# Timss Questions



1. Which equation summarizes the formation of 1<sup>st</sup> class lever :

- a. (Effort force → Resistance force → Fulcrum) → Stapler
- b. (Effort force → Fulcrum → Resistance force) → Pincers
- c. (Effort force → Fulcrum → Resistance force) → Tweezers
- d. (Resistance force → Effort force → Fulcrum) → Ice holder

2. Ahmed investigates the type of levers which is considered the most popular type of levers in our daily life , he plots his results as shown below.



• In the previous graph, first class levers are considered the letter .....

- a. A
- b. B
- c. C

3. Which two levers are second class levers :

- a. Pincers and pliers.
- b. Stapler and tweezers.
- c. Bottle opener and stapler.
- d. Manual broom and hockey bat.

4. Some levers increase the speed of objects that we inflict on as tweezers.

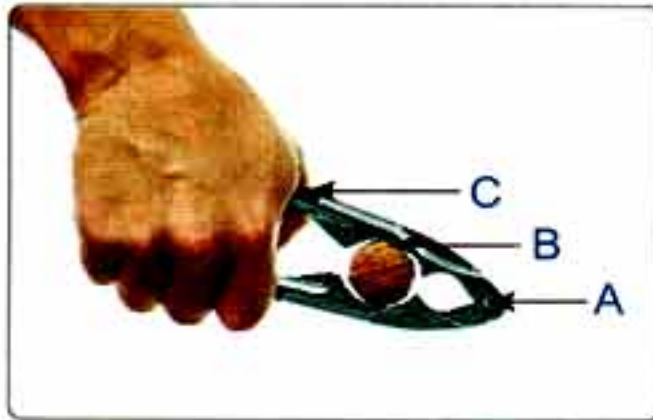
Choose the correct answer :

- a. Statement and the example are right.
- b. Statement and the example are wrong.
- c. Statement is wrong while the example is right.
- d. Statement is right while the example is wrong.



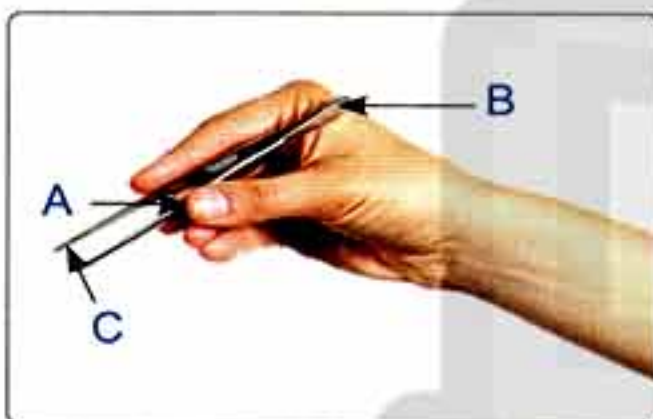
5. Label each picture by putting the position of fulcrum (O), effort force (F) and resistance force (R), then mention the type of each lever.

(1)



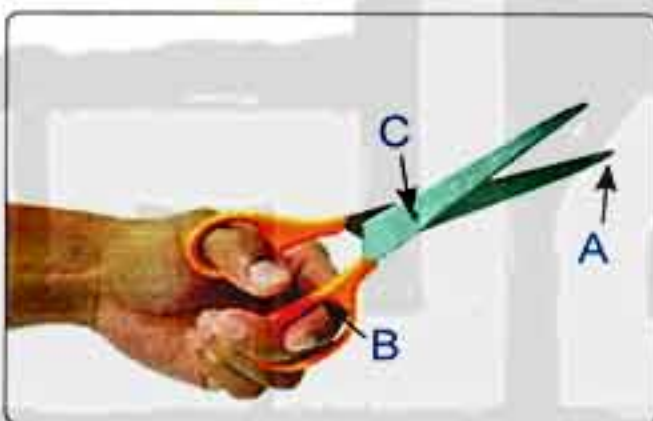
- (A) is .....
- (B) is .....
- (C) is .....
- The type of lever is .....

(2)



- (A) is .....
- (B) is .....
- (C) is .....
- The type of lever is .....

(3)



- (A) is .....
- (B) is .....
- (C) is .....
- The type of lever is .....

Now at all bookstores

 EL-MOASSER

in


**English & Maths**

For all educational stages



# Questions on lesson two



Questions signed by  have been taken from the school book.

## 1. Choose the correct answer :

- The law of levers states that .....
  - force  $\times$  its arm = resistance  $\times$  its arm.
  - force  $\div$  its arm = resistance  $\div$  its arm.
  - force + its arm = resistance + its arm.
  - force  $\times$  its arm = resistance + its arm.
- The values of effort and resistance in the lever depend on .....
  - the arm of force.
  - the arm of resistance.
  - the position of fulcrum.
  - (a) and (b).
- The distance between the effort force and fulcrum is .....
  - the effort force.
  - the resistance arm.
  - the effort force arm.
  - the resistance force.
- The distance between the resistance force and fulcrum is .....
  - the arm of force.
  - the arm of resistance.
  - the arm of force – arm of resistance.
  - the arm of force + arm of resistance.
- When the arm of force is longer than the arm of resistance, the effort force is ..... the resistance.
  - larger than
  - smaller than
  - equal to
  - double
- When the arm of force ..... the arm of resistance, the effort force equals the resistance force.
  - $>$
  - $<$
  - $=$
  - $\neq$
- When the arm of force ..... the arm of resistance, the lever doesn't conserve effort.
  - is shorter than
  - is longer than
  - equals
  - (a) and (c)
- When the arm of force equals 4 cm. and the arm of resistance equals 4 cm., so .....
  - the effort force = the resistance force.
  - the effort force  $>$  the resistance force.
  - the resistance force  $<$  the effort force.
  - the effort force  $<$  the resistance force.



9. The lever doesn't save effort when .....
- the effort arm is longer than the resistance arm.
  - the effort arm is shorter than the resistance arm.
  - the effort force is larger than the resistance force.
  - (b) and (c).
10. The effort force and resistance force are measured in .....
- Newton.
  - metre.
  - centimetre.
  - Hertz.
11. Force arm is sometimes equal to resistance arm in ..... class levers.  
(Damietta & Kalyoubia 2017)
- first
  - second
  - third
  - first and third
12. The type of levers which sometimes has a mechanical benefit is the .....
- first class levers.
  - second class levers.
  - third class levers.
  - fourth class levers.
13. The type of levers which always doesn't save effort is the .....
- first class levers.
  - third class levers.
  - second class levers.
  - fourth class levers.
14. The type of levers which always has a mechanical benefit is the .....
- first class levers.
  - second class levers.
  - third class levers.
  - fourth class levers.
- (Kafr El-Sheikh 2017)
15. When the effort arm equals 5 cm. and the resistance arm equals 10 cm., so .....
- the type of lever may be a first class lever.
  - the effort force is larger than the resistance force.
  - the type of lever may be a third class lever.
  - (a), (b) and (c).
16. Which of the following levers saves effort ? .....  
(Cairo & Giza 2016)
- Scissors.
  - Nutcracker.
  - Fishing tool.
  - Sweet holder.
17. When the length of the force arm equals 2.5 metre and the length of the resistance arm equals 1.5 metre, so .....
- the resistance force is larger than the effort force.
  - the lever has a mechanical benefit.
  - this lever saves effort.
  - (a), (b) and (c).
18. Which of the following levers doesn't save effort ? .....
- Coal holder.
  - Nutcracker.
  - Wheelbarrow.
  - Bottle opener.



## Unit One

19. Which of the following levers has the arm of force longer than the arm of resistance ? .....
- a. Manual broom. b. Ice holder.  
c. Soda water opener. d. Tweezers.
20. All the following levers don't save effort except .....
- a. nutcracker. b. ice holder. c. fishing tool. d. hockey bat.

**2. Match column (A) with its correspondence in column (B) :** (Kalyoubia 2015)

(A)	(B)
1. First class levers.	a. Levers that always conserve effort.
2. Second class levers.	b. Levers that do not conserve effort.
3. Third class levers.	c. Levers that sometimes conserve effort.
4. Levers.	d. A fixed point that a rigid bar rotates around.
5. The resistance.	e. A rigid bar rotates around a fixed point, and is affected by a force and a resistance.
6. The fulcrum.	f. A force that is resulted from the body that we want to move.

1. .... 2. .... 3. ....  
4. .... 5. .... 6. ....

**3. Put (✓) in front of the right statement and (✗) in front of the wrong one, then correct it :**

1. The force  $\times$  its arm = The resistance  $\times$  its arm. ( )
2. The resistance arm is the distance between the resistance force and fulcrum. ( )
3. When the force arm is equal to the resistance arm, the lever conserves effort. ( )
4. When the resistance arm is longer than the effort arm, the lever saves effort. ( )
5. When the resistance arm is shorter than the effort arm, the lever doesn't conserve effort. ( )
6. If the arm of force is shorter than the arm of resistance, the lever conserves effort. (Red Sea 2017) ( )
7. The effort force is measured in centimetre or metre. ( )
8. The length of the force arm and the length of the resistance arm determine the value of effort force and resistance force. ( )
9. The resistance arm is measured in metre. ( )



10. In the second class levers, the effort arm is always longer than the resistance arm. ( )
11. The resistance force is larger than the effort force in the third class levers. ( )
12. Some of the first class levers conserve effort while the others don't. ( )
13. In the wheelbarrow, the resistance arm is shorter than the effort arm. ( )
14. In the 3<sup>rd</sup> class levers, the arm of force may be equal to the arm of resistance. ( )
15. Hockey bat and tweezers have a mechanical benefit. ( )
16. Manual broom and ice holder don't conserve effort. ( )
17. In nutcracker, the effort arm is shorter than the resistance arm. ( )
18. In soda water opener, the resistance force is smaller than the effort force. ( )
19. The third class levers always save effort. (Giza 2017) ( )

#### 4. Write the scientific term of each of the following :

1. The distance between the effort force and fulcrum. (Cairo 2016) (.....)
2. The distance between the resistance force and fulcrum. (.....)
3. Force  $\times$  its arm = Resistance  $\times$  its arm. (.....)
4. A force that increases when the effort force arm is shorter than the resistance arm. (.....)
5. A force that increases when the resistance arm is shorter than the force arm. (.....)
6. A type of levers that always conserves effort or has a mechanical benefit. (Qena 2016) (.....)
7. A type of levers that sometimes saves effort and other times doesn't conserve effort. (Giza 2016) (.....)
8. Type of levers that always doesn't save effort. (Beheira & Sohag 2017) (.....)
9. A type of levers that sometimes its force arm is equal to the resistance arm. (.....)
10. A type of levers, where the effort arm is always longer than the resistance arm. (.....)
11. A type of levers, where the effort arm is always shorter than the resistance arm. (.....)
12. A type of levers, where the effort force is always smaller than the resistance force. (.....)
13. A type of levers, where the effort force may be larger or smaller than the resistance force. (.....)









## Unit One

14. A type of levers, where the effort force is always larger than the resistance force. ( ..... )
15. They are simple machines that always save effort. ( ..... )

(North Sinai 2017)

**5. Complete the following statements :**

1.  The law of levers states that .....
2. The arm of force is the distance between ..... and .....
3. The distance between fulcrum (O) and resistance(R) is called .....
4.  Force  $\times$  its arm = .....  $\times$  ..... (El-Menofia 2016)
5. The factors that determine the values of force and resistance are ..... and .....
6. When the arm of force equals the arm of resistance, the ..... is equal to the .....
7. If the arm of force is shorter than the arm of resistance, the ..... is larger than ..... (Sharkia & Fayoum 2017)
8. The effort force is measured in .....
9. The resistance arm is measured in .....
10. When the force arm is longer than the resistance arm, ..... is smaller than .....
11. When the force arm is equal to the resistance arm, the lever doesn't conserve .....
12. The effort force is larger than the resistance force when ..... is longer than .....
13.  The force and resistance are equal in levers if .....
14. The lever conserves effort when ..... arm is longer than ..... arm.
15. The lever doesn't conserve effort when ..... arm is shorter than ..... arm.
16.  The only type of levers, where the arm of force and the arm of resistance are equal is the .....
17.  There is a conservation of effort in the first class levers if ..... is longer than ..... (Damietta 2017)
18.  The type of levers that always conserves effort is ..... , while the type of levers that doesn't always conserve effort is ..... (Gharbia 2015)







19. The first class levers have no ..... benefit when the force arm is shorter than ..... or when the two arms are .....
20. In the first class levers, when the effort force is ..... the resistance force, the lever has a mechanical benefit. (Giza 2015)
21. In the first class levers, when the effort force is equal to the resistance force, the lever ..... effort.
22. The second class lever has a mechanical benefit, because ..... is longer than .....
23. In the ..... levers, the effort force is always smaller than the resistance, while in the ..... levers, the effort force is always larger than the resistance force.
24. Wheelbarrow has a mechanical benefit as it is ..... class lever.
25. In stapler and nutcracker, the ..... is longer than .....
26. Tweezers and coal holder haven't a mechanical benefit, because ..... is shorter than .....
27. .... levers don't conserve effort, because the arm of resistance is always longer than the arm of effort force.
28. The lever conserves effort when its force arm is ..... than the resistance arm, and the force is ..... than the resistance. (Alex. 2017)
29. When the length of the resistance arm and the effort arm equals 5 cm. and the resistance = 2 Newton, so the effort force equals .....
30. When the effort force equals 20 Newton, resistance is 8 Newton and effort force arm = 4 cm. , so the resistance arm equals .....

### 6. Give reasons for the following :

1. When the resistance arm is longer than the effort arm, the lever doesn't conserve effort.  
.....
2. When the force arm and the resistance arm are equal, the lever doesn't conserve effort or has no mechanical benefit.  
.....
3. When the force arm is longer than the resistance arm, the lever conserves effort.  
.....
4. The crowbar conserves effort.  
.....



## Unit One

5.  The force and resistance can be equal only in the first class levers. (Gharbia 2017)
6. Sometimes the 1<sup>st</sup> class levers save effort.
7.  The second class levers always conserve effort. (Cairo & Giza 2017)
8. The soda water opener saves effort.
9. The force is not equal to the resistance in the 2<sup>nd</sup> class lever.
10.  The third class levers always don't conserve effort. (Sharkia & Aswan 2017)
11. Nutcracker and wheelbarrow have a mechanical benefit.
12. In the 2<sup>nd</sup> class levers, the force is always less than the resistance.
13. In the stapler, the effort force is smaller than the resistance force.
14. •  Some of the levers are important to man although they don't conserve effort.  
• The 3<sup>rd</sup> class levers are very important in our life although they don't conserve effort. (Sohag 2015)
15. In spite of the importance of the coal holder, it is from the levers that don't save effort. (Kalyoubia 2015)

## 7. What is meant by ... ?

1. The law of levers.
2. The effort force arm.
3. The arm of resistance.



## 8. Correct the underlined words :

- The arm of force is the distance between the effort force and the resistance. (Damietta 2016) (.....)
- Force  $\times$  arm of resistance = Resistance  $\times$  its arm. (.....)
- When the arm of effort force is longer than the arm of resistance, the resistance is smaller than the effort force. (.....)
- When the arm of force is equal to the arm of resistance, the force is larger than the resistance. (.....)
- The only type of levers in which the arm of force may be equal to the arm of resistance is the third class levers. (.....)
- The third class levers always save effort. (Assiut & Red Sea 2016) (.....)
- The first class lever always hasn't a mechanical benefit. (.....)
- When the effort arm equals 5 cm., resistance arm equals 5 cm. and resistance equals 7 Newton, so the effort force equals 35 Newton. (.....)
- The only type of levers which always saves effort is the third class levers. (.....)
- When the effort arm is longer than the resistance arm, the force is larger than the resistance. (.....)
- If the resistance arm is longer than the effort arm, so the lever saves effort. (.....)
- Force arm is equal to resistance arm in second class levers. (.....) (Beheira 2015)
- Although crowbar is a third class lever, it conserves effort. (.....) (Gharbia 2017)

## 9. What happens when ... ?

- The force arm and the resistance arm are equal. (Ismailia 2017) (.....)
- The force arm is longer than the resistance arm. (El-Menofia 2017) (.....)
- The resistance force is equal to the effort force. (.....)
- The resistance arm is longer than the force arm. (Cairo 2016) (.....)
- The resistance force is larger than the effort force. (.....)



## Unit One

6. The effort force is larger than the resistance force.  
.....
7. Both of effort arm and resistance arm equal 7 metres.  
.....
8. The length of the force arm is half the length of the resistance arm for a lever.  
.....  
(Damietta 2017)

10. Compare between the three types of levers using the following table :

Points of comparison	First class lever	Second class lever	Third class lever
• Definition :	..... .....	..... .....	..... .....
• Importance :	..... .....	..... .....	..... .....
• Conservation of effort :	..... .....	..... .....	..... .....
• Examples :	..... .....	..... .....	..... .....

(Giza 2016)

11. The following table shows results of a balanced seesaw, answer the following questions :




Case	The force (Newton)	Arm of force (m)	The resistance (Newton)	Arm of resistance (m)
①	(a)	3	300	2
②	500	(b)	400	2.5
③	300	3	(c)	3
④	40	5	25	(d)
⑤	(e)	4	20	1

1. Find the missing numbers (a), (b), (c), (d) and (e) in the table.
- .....
- .....
- .....
- .....



2. Which cases save effort and which of them don't save effort ? Why ?

### 12. Problems :

- The boy whose weight is 250 Newton sits on a seesaw at 3 metres from the fulcrum. Where a 150 Newton girl must sit to balance the seesaw ?
- A long uniform metallic bar is hanged from its mid point. A force of 40 Newton is exerted at 5 cm. from this mid point. Find the weight which must be hanged at 25 cm. to make the bar get balanced.
- The length of the force arm of a crowbar is 100 cm. and the length of the resistance arm is 15 cm. If the value of resistance equals 400 Newton, calculate the value of effort force and mention the type of the lever.
-  The exerted force of the first class lever equals 500 Newton and the length of its arm is 20 cm. and is affected by a resistance with a value of 200 Newton. Find the length of the arm of the resistance. (Giza & Beheira 2017)
-  The length of the force arm of a third class lever is 5 cm. and the length of the arm of resistance is 15 cm. If the resistance has a value of 300 Newton, calculate the value of the affecting force. (Sharkia 2017)
-  The force affecting on a second class lever equals 200 Newton and the length of its arm is 50 cm. If the value of the resistance 1000 Newton, calculate the value of the resistance arm. (Dakahlia & Red Sea 2017)



## Unit One

7. In a 2<sup>nd</sup> class lever, the effort force is 100 Newton, length of the force arm = 25 cm. and the resistance = 500 Newton. Calculate the resistance arm.  
(Matrouh 2015)

8. A third class lever, where the effort force = 200 Newton, the force arm = 5 cm. and the resistance force = 100 Newton. Calculate the length the of the resistance arm.  
(El-Minia 2017)

9. A force of 500 Newton affects a first class lever and its arm of force equals 10 cm., the resistance equals 200 Newton and its arm of resistance equals 20 cm. in this example is the lever in state of balance or not and why ?  
(El-Menofia & Gharbia 2017)

10. In the opposite figure, calculate the effort force when the resistance force equals 12 Newton, then mention the type of lever and why ?



11. A force of 500 Newton affects a lever of the first order and its force arm is 20 cm. Calculate the resistance given that the arm of the resistance equal 50 cm.  
(Alex. 2016)

12. A force of 480 Newton affects a lever and the length of the force arm is 40 cm, if the length of resistance arm is 60 cm, Calculate :

(1) The value of the resistance that regains the balance of the lever.

(2) From the previous answer, complete the following statement :

This lever ..... effort, and it is considered from the ..... or ..... class levers.  
(El-Gharbia 2016)



13. Determine by drawing the number of weights which must be placed at a distance of one hole of fulcrum to become the lever balance, where the distance between every two holes is 1 cm.

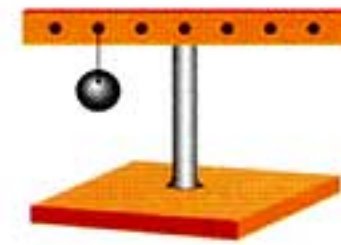


Fig. (a)

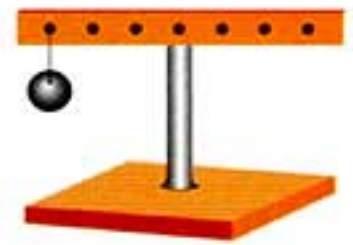


Fig. (b)

14. The opposite figure represents a lever.  
(1) What is the type of this lever ?



- (2) The exerted force of the lever equal 200 Newton and the length of its arm is 50 cm. and is affected by a resistance with a value of 500 Newton. Find the value of the arm of the resistance.

(El-Menofia 2016)

15. Study the following figure, then calculate the weight of the rock.



- 13.** Determine which of the following levers conserves effort. Give reason for your answer.

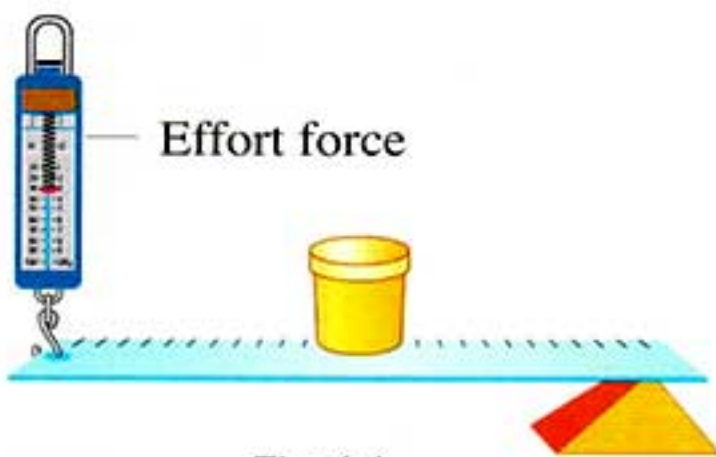


Fig. (a)

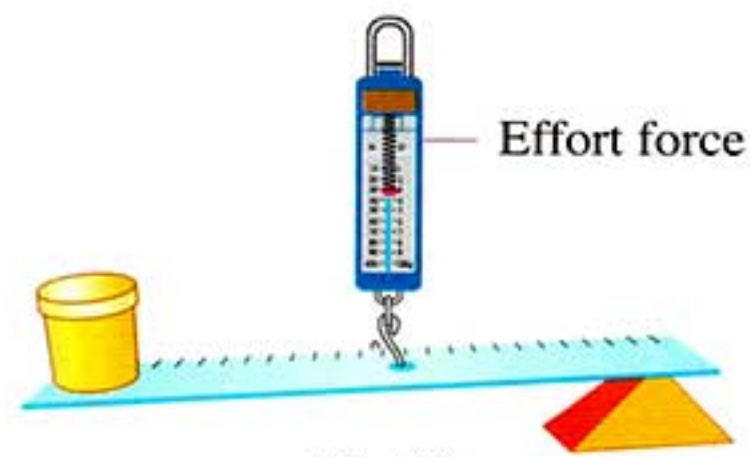


Fig. (b)



## Unit One

14. Classify the following tools according to the type of the lever : (Suez 2015)



(1).....



(2) .....



(3) .....

Determine which of the following levers conserves the effort and give reason.

.....  
 .....

15. Write your own paragraph on each concept :

**The force  $\times$  Its arm = The resistance  $\times$  Its arm**

States that

**Law of levers**

used in

**Determining the mechanical purpose of levers**

First class levers



(1).....

.....  
 .....  
 .....  
 .....

(2).....

.....  
 .....  
 .....  
 .....

Second class levers



Conserve  
effort

Third class levers



(3).....

.....  
 .....  
 .....  
 .....



# Timss Questions



1. Ramy rides on a seesaw with his sister Eman and then with his brother Ayman.

Ramy is the same weight as Eman, but Ayman is twice the weight of Ramy.



Ramy

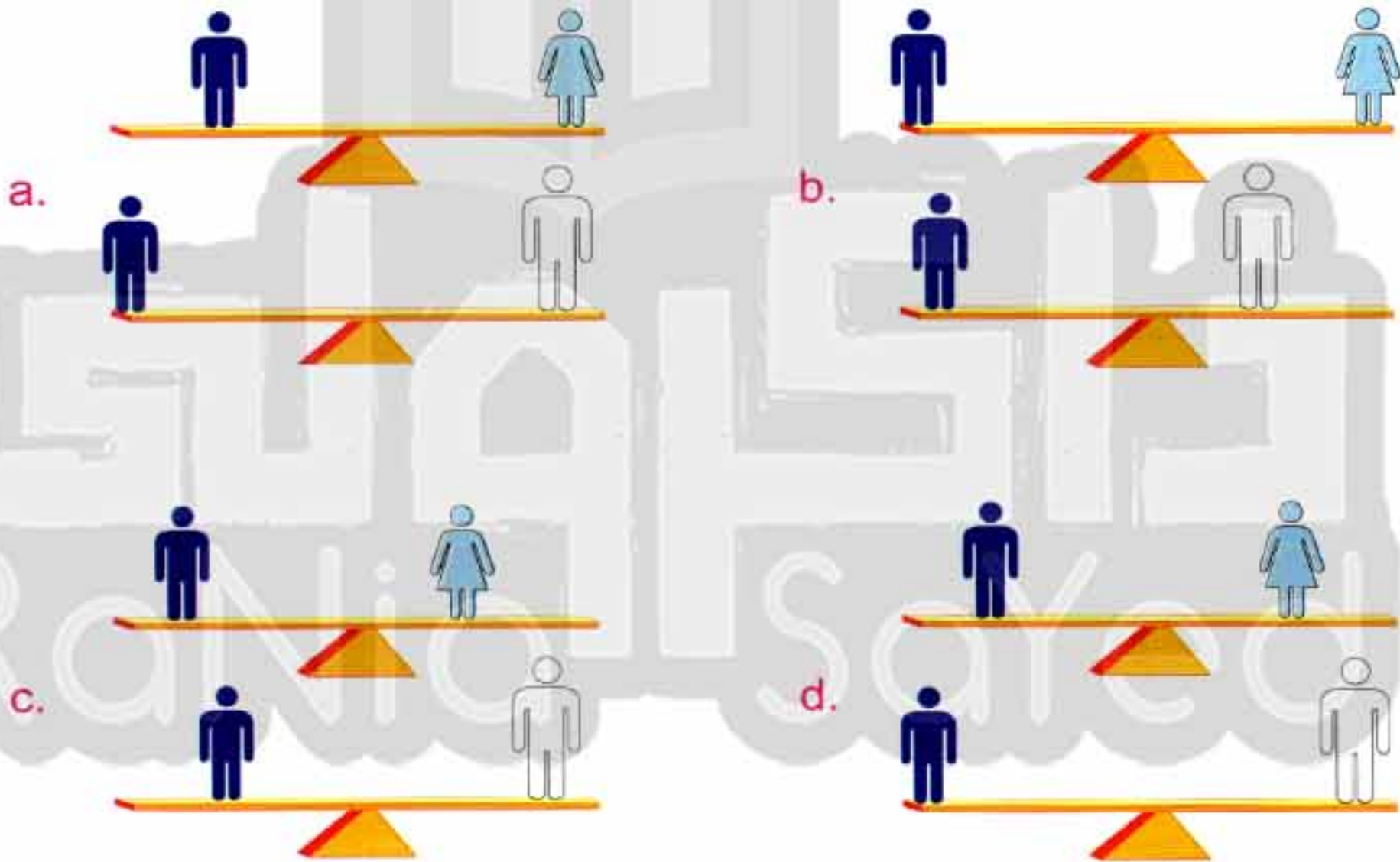


Eman



Ayman

Which figure shows where the children should sit so that Ramy can balance first with Eman and then with Ayman?



2. If two pupils (A) and (B) sit on a seesaw from its two sides at the same distance away from fulcrum, they found that the seesaw get balanced. If the weight of pupil (A) is 40 Newton, so the weight of pupil (B) is .....

- a. twice the weight of pupil (A).      b. half the weight of pupil (A).  
c. equal to the weight of pupil (A).      d. not equal to the weight of pupil (A).

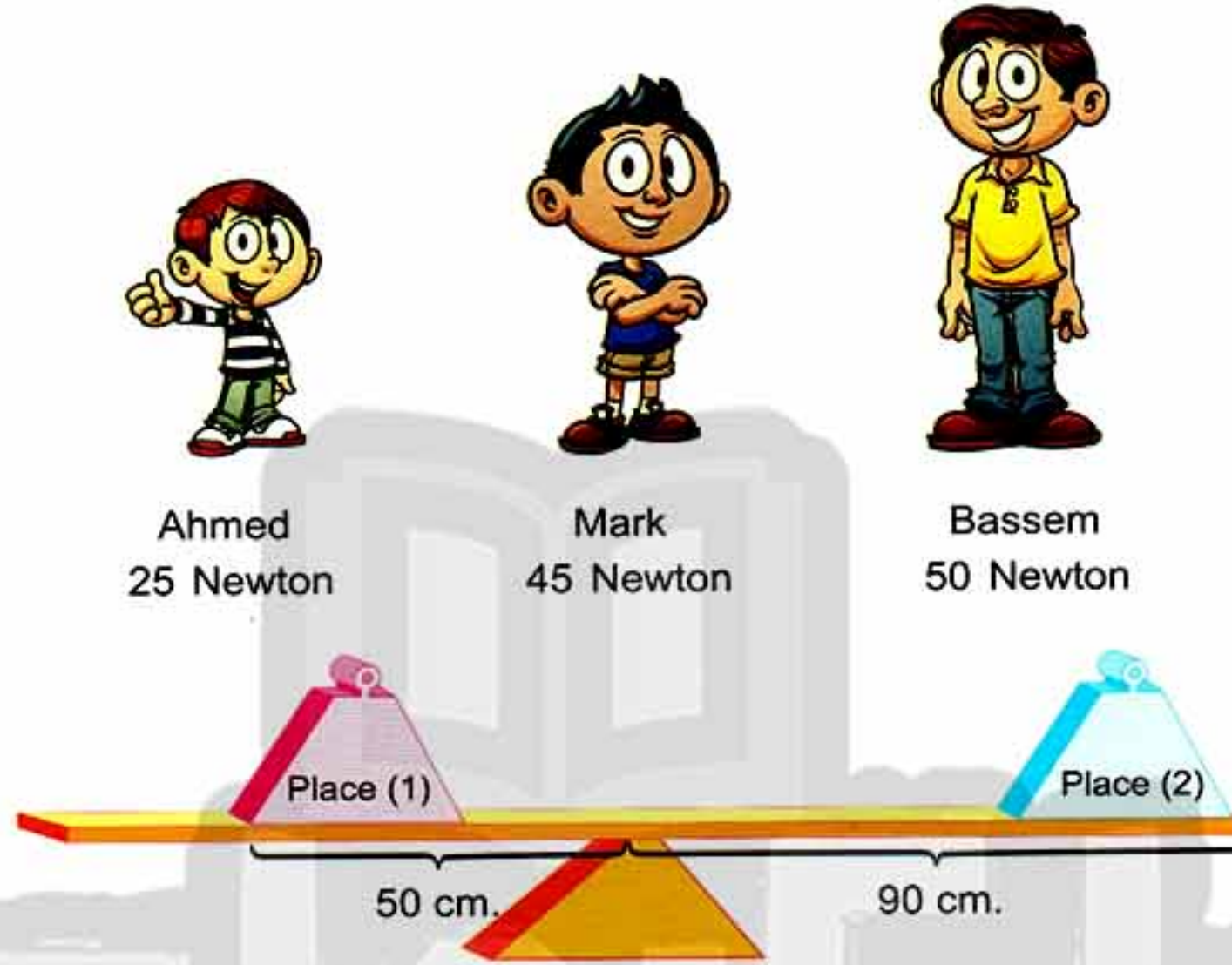
3. If the distance between resistance force and fulcrum = 5 cm. So to save effort, the distance between effort force and fulcrum must be .....

- a. equal 5.      b. more than 5.      c. less than 5.



## Unit One

4. Ahmed, Mark and Bassem are three friends. Ahmed weighs 25 Newton, Mark weighs 45 Newton, while Bassem weighs 50 Newton.



If they want to make the previous seesaw to get balanced, So ..... must sit in place (1), while ..... must sit in place (2).

## الآن



استمتع بمشاهدة شرح الدروس والتجارب والأنشطة التفاعلية على هاتفك الذكي أو جهازك اللوحي عن طريق تحميل تطبيق :

"EL-Moasser science 6<sup>th</sup> prim. T2"



GET IT ON  
Google Play

و ذلك من خلال



أو من خلال QR CODE الآتي



## Unit one

## Lesson 1

Total mark

25

## Worksheet 1

Answer each of the following questions :

## 1. Complete the following statements : (5 marks)

1. The crowbar is considered a ..... class lever but the ..... is a third class lever.
2. In the second class lever, the ..... lies between ..... and .....
3. Hockey bat is a lever that used to increase the ..... of the ball.
4. Wheelbarrow and nutcracker have the ..... between fulcrum and .....
5. .... are levers that used to pick up the very small objects, while ..... is a lever that used to move the object for a longer distance.

## 2. [A] Give reasons for : (5 marks)

1. Levers are very important in our daily life.

.....

.....

2. Seesaw is considered as a first class lever.

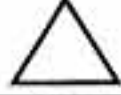


.....

.....

## [B] Correct the underlined words :

1. Second class levers are the most popular type of levers in our daily life. (.....)
2. Coal holder is a first class lever. (.....)
3. In the third class lever, the fulcrum lies between the effort force and the resistance force. (.....)

## 3. Put the symbols shown in the opposite table in the right order to illustrate the different types of levers in fig. (1), fig. (2) and fig.(3) :

Item	Symbol
Fulcrum	
Effort force	
Resistance force	

(5 marks)

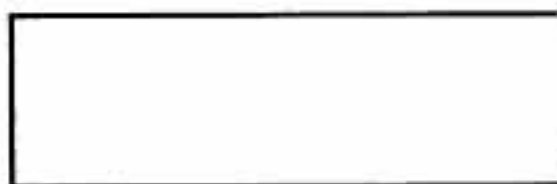


Fig. (1)  
First class lever

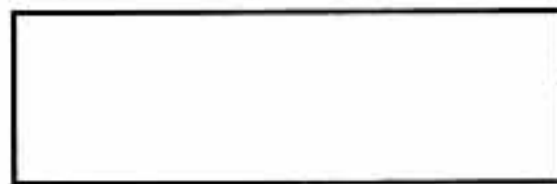


Fig. (2)  
Second class lever

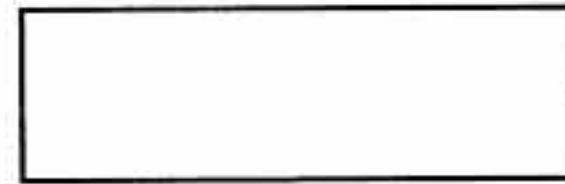


Fig. (3)  
Third class lever



## Worksheets

## 4. [A] What is meant by ... ?

(5 marks)

1. The lever.

.....

2. Third class lever.

.....

.....

## [B] Write the scientific term :

1. The fixed point at which the lever rotates.

( ..... )

2. Levers that have fulcrum between the effort force and resistance force.

( ..... )

3. Levers that have the resistance force between the effort force and fulcrum.

( ..... )

## 5. Classify the following levers according to their type in the table below : (5 marks)

Pincers – Tweezers - Nail clippers – Bottle opener – Stapler – Ice holder –  
Nutcracker – Hammer claw – Fishing tool.

First class levers	Second class levers	Third class levers
.....	.....	.....
.....	.....	.....
.....	.....	.....



## Unit one

## Lesson 2

Total mark

25

## Worksheet

2

Answer each of the following questions :

## 1. Complete the following statements :

(5 marks)

1. In the second class levers, the arm of ..... is always longer than the arm of .....
2. Effort force  $\times$  ..... = .....  $\times$  .....
3. The ..... class levers always don't save effort.
4. A lever has a mechanical benefit when ..... is longer than .....
5. In the third class lever, the ..... force always greater than ..... force.

## 2. [A] What happens if ... ?

(5 marks)

1. The effort arm is longer than the resistance arm.

2. The amount of effort force is equal to the amount of resistance force.

3. The length of effort arm is half the length of resistance arm.

## [B] Correct the underlined words :

1. Levers of the second class always have no mechanical benefit.

( ..... )

2. The effort arm is always longer than the resistance arm in the third class lever.

( ..... )

## 3. Solve the following problems :

(5 marks)

1. The length of effort arm of a crowbar is 160 cm. and the length of resistance arm is 60 cm. If the value of effort force equals 30 Newton.

Calculate the value of resistance force and mention the type of this lever.



## Worksheets

2. In a first class lever, the resistance force equals 60 Newton. Calculate the length of the resistance arm. (knowing that the effort force  $\times$  its arm equal 300).

.....

.....

.....

4. Compare between the three types of levers :

(5 marks)

Points of comparison	First class levers	Second class levers	Third class levers
1. Definition :	..... ..... .....	..... ..... .....	..... ..... .....
2. Conservation of effort :	..... ..... .....	..... ..... .....	..... ..... .....
3. Example :	..... ..... .....	..... ..... .....	..... ..... .....

5. [A] Write the scientific term :

(5 marks)

- The distance between the resistance force and fulcrum. (.....)
- The distance between the effort force and fulcrum. (.....)

[B] Determine by drawing the number of weights which must be placed at a distance of one hole of fulcrum to become the lever balance, where the distance between every two holes is 1 cm.

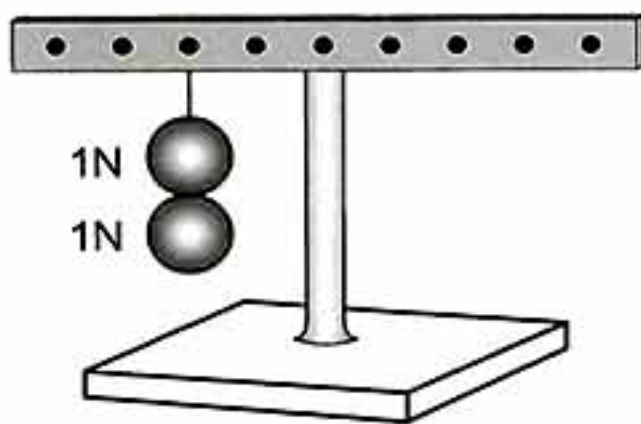


Fig. (a)

.....

.....

.....

.....

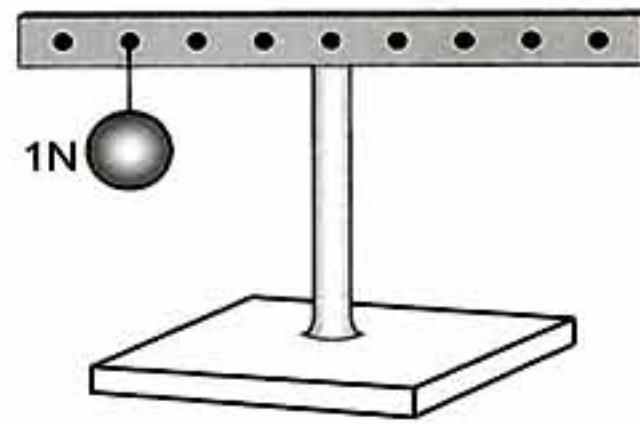


Fig. (b)

.....

.....

.....

.....



## General Exercise of the School Book on

## 1. Match column (A) with its correspondence in column (B):

(A)	(B)
1. Levers that always conserve the effort.	a. First class levers.
2. Levers that not conserve the effort.	b. Second class levers.
3. Levers that sometimes conserve the effort.	c. Third class levers.
4. A fixed point that a rigid bar rotates around.	d. The lever.
5. A rigid bar rotates around a fixed point, and is affected by a force and a resistance.	e. The force.
	f. The resistance.
	g. The fulcrum.

1. .... 2. .... 3. ....  
4. .... 5. .... 6. ....

## 2. Put (✓) or (✗) in front of each of the following sentences and correct the false ones :

1. The first class levers have the resistance between the force and the fulcrum. ( )  
.....  
2. The second class levers have the force between the resistance and the fulcrum. ( )  
.....  
3. The third class levers have the fulcrum between the force and the resistance. ( )  
.....  
4. The crowbar is an example of the first class levers. ( )  
.....  
5. If the arm of force is shorter than the arm of resistance, then the lever conserves effort. ( )  
.....

## 3. Complete the following sentences :

1. The nutcracker is an example of the ..... levers.  
2. The manual broom is an example of the ..... levers.  
3. The scissors are example of the ..... levers.  
4. Force  $\times$  its arm = .....  $\times$  .....  
5. The type of the levers where the arm of force and the arm of resistance are equal is .....



## Worksheets

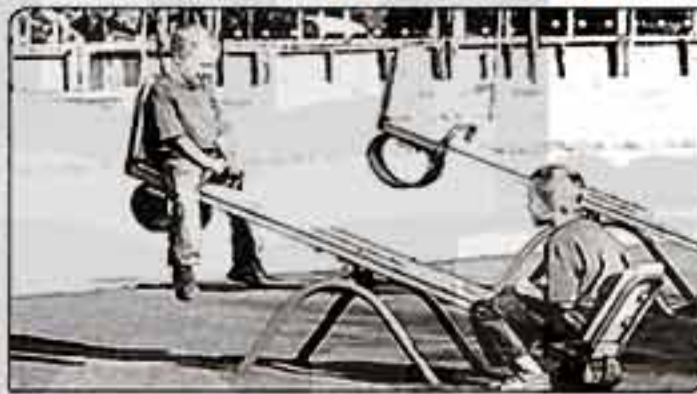
4. Compare between the three types of levers using the following table :

Points of comparison	First class lever	Second class lever	Third class lever
Definition :	..... ..... .....	..... ..... .....	..... ..... .....
Conservation of effort :	.....	.....	.....
Examples :	..... .....	..... .....	..... .....

5. Classify the following tools according to the type of lever :



1. ....



2. ....



3. ....



4. ....



5. ....



6. ....

6. The affecting force on a second class lever equals 200 Newton and the length of its arm is 50 cm. if the value of the resistance force 1000 Newton, calculate the value of the arm of resistance.

.....  
.....

7. The length of the force arm of a third class lever is 5 cm, and the length of the arm of the resistance is 15 cm. if the resistance force has a value of 300 Newton, calculate the value of the affecting force

.....  
.....



## Model Exam

## 1

## on Unit one

Answer each of the following questions :

1. Complete the following statements :

(5 marks)

1. Levers make tasks easier by means of ..... and .....
2. Nutcracker has a mechanical benefit, because ..... is longer than .....
3. Water pump is considered a ..... class lever, while the manual broom is ..... class lever.
4. In the third class levers, the ..... is between the fulcrum and .....
5. The resistance arm is the distance between ..... and .....

2. [A] Give reasons for :

(5 marks)

1. Crowbar and tweezer are levers.

.....  
.....

2. The second class levers always save effort.

.....

[B] Write the scientific term :

1. The most popular type of levers in our daily Life. ( ..... )
2. A force that increases when the resistance arm is longer than the effort force arm. ( ..... )
3. They are simple machines that always save effort. ( ..... )

3. Choose the correct answer :

(5 marks)

1. All the following are from the first class levers except .....  
a. the crowbar.      b. the scissors.      c. the nutcracker.      d. the seesaw.
2. Sweet holder is from the ..... class levers.  
a. first      b. second      c. third      d. fourth
3. When the arm of resistance ..... the arm of force, the effort force equals the resistance force.  
a. >      b. <      c. =      d. ≠



## Worksheets

4. All the following are from the importance of levers except .....

- a. increasing force.                      b. decreasing speed.  
c. increasing speed.                      d. increasing distance.

5. Which of the following levers doesn't save effort ? .....

- a. Nutcracker.      b. Stapler.                      c. Manual broom.                      d. Wheelbarrow.

#### 4. [A] What happens when ... ?

(5 marks)

1. The force arm is shorter than the resistance arm in the lever.

.....

2. Both of resistance arm and effort force arm equal 5 meters.

.....

#### [B] Correct the underlined words :

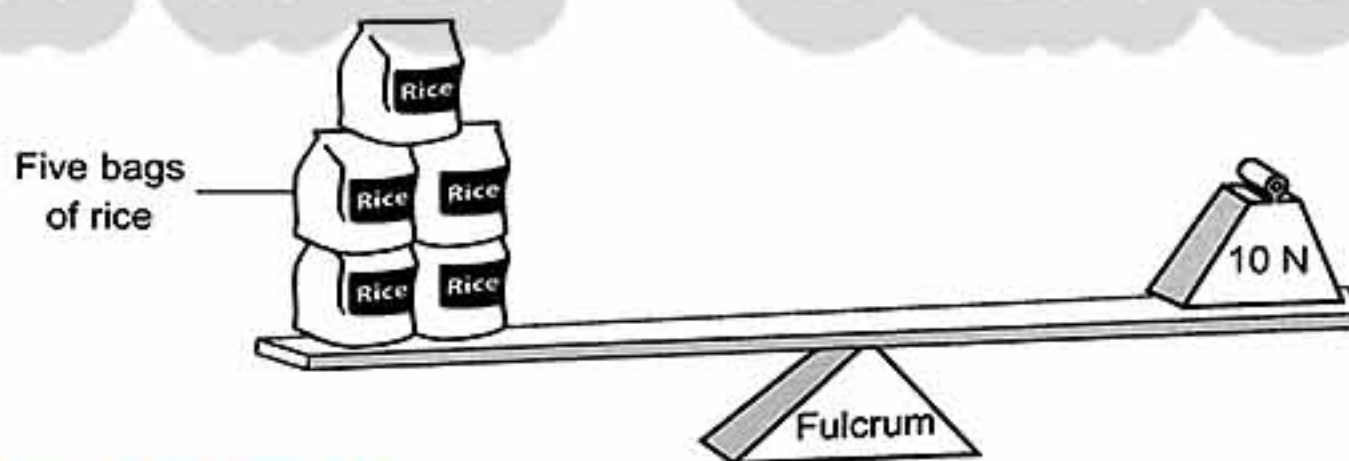
1. Wheelbarrow is a first class lever. ( ..... )  
2. Coal holder is used to increase distance. ( ..... )  
3. The third class levers always save effort. ( ..... )

#### 5. [A] Mention one example of lever used for :

(5 marks)

1. Moving force from one place to another : .....  
2. Accuracy in performance : .....

[B] The following figure shows five identical bags of rice are balanced with an effort force equals 10N.



#### Choose the correct answer :

1. Each bag of rice is balanced with an effort force equals .....

- a. 1N.                      b. 2N.                      c. 10N.                      d. 5N.

2. If we remove one bag of rice, So the remained four bags of rice are balanced with an effort force equals .....

- a. 10N.                      b. 2N.                      c. 4N.                      d. 8N.

(Note : the place of fulcrum is fixed and can not be changed.)



## Model Exam

2

## on Unit one

Total mark

25

Answer each of the following questions :

## 1. [A] Choose the correct answer :

(5 marks)

- Resistance arm is sometimes equal to force arm in ..... class levers.  
a. first                      b. second                      c. third                      d. first and third
- ..... is considered from first class levers.  
a. Nutcracker                      b. Hammer claw                      c. Ice holder                      d. Fishing tool
- Which of the following levers is used to avoid dangers ? .....  
a. Tweezers.                      b. Sweet holder.                      c. Coal holder.                      d. Scissors.

## [B] Give reasons for :

- Nutcracker is considered as an increasing force lever.  
.....
- The third class levers always don't conserve effort.  
.....  
.....

## 2. [A] Write the scientific term :

(5 marks)

- The type of levers that its mid point is the resistance force. ( ..... )
- Force  $\times$  its arm = Resistance  $\times$  its arm. ( ..... )
- A type of levers, where the effort force may be larger or smaller than the resistance force. ( ..... )

## [B] What is meant by ... ?

- Fulcrum.  
.....
- The effort force arm.  
.....

## 3. Complete the following statements :

(5 marks)

- When the arm of force is equal to the arm of resistance, then ..... is equal to .....
- The factors that determine the values of force and resistance are ..... and .....



## Worksheets

3. There is a conservation of effort in the first class levers if ..... is longer than .....
4. Stapler has the ..... between fulcrum and .....
5. When the length of each of the effort arm and the resistance arm equals 8 cm. and the resistance = 5 Newton, so the effort force equals .....

**4. Put (✓) or (x) in front of each of the following sentences and correct the false ones : (5 marks)**

1. Bottle opener, wheelbarrow and paddle are examples of second class levers. ( )  
.....
2. Hockey bat and tweezers have a mechanical benefit. ( )  
.....
3. The effort force arm is meseasured in Newton. ( )  
.....
4. Among the functions of levers is to decrease the speed. ( )  
.....
5. The resistance arm is the distance between the resistance force and fulcrum. ( )  
.....

**5. [A] A force of 360 Newton and an arm of length 4 cm affect on a lever. (5 marks)**

If the value of resistance equals 200 Newton, determine the location of the resistance to balance the lever.

.....

.....

.....

**[B] Choose from column (B) what suits it in column (A).**

(A)	(B)
1. Levers always save effort.	a. Lever.
2. Levers always don't save effort.	b. Force.
3. Levers sometimes save effort.	c. Third class.
4. A rigid bar rotates around a fixed point and is affected by a force and a resistance.	d. Second class.
	e. First class.

1. .... 2. .... 3. .... 4. ....



## GEM

## Exercises on Lesson

1

Answer Guide P. 2

## 1 Choose the correct answer:




- Levers rotate around a fixed point called ..... (Cairo 2019)  
a. resistance force   b. fulcrum   c. effort force   d. rigid bar
- The force that is exerted to equilibrate the resistance is called .....  
a. fulcrum   b. effort   c. friction   d. (a) and (b)
- The first simple machines man invented to lift heavy objects were called ..... (Menofia 2016)  
a. levers   b. bike   c. planes   d. (a) and (b)
- The function of a lever is to increase ..... (Cairo 2019)  
a. force   b. distance  
c. speed   d. all the previous answers
- All levers and machines .....  
a. are made of the same substances   b. are similar in shape and size  
c. don't have a specific function   d. have a fixed point called "fulcrum"
- 🏰 All of the following are among functions of levers except ..... (Luxor 2016)  
a. increasing speed   b. increasing force  
c. increasing size   d. accuracy in performance
- ..... is/are used to pick up very small objects.  
a. Coal holder   b. Tweezers   c. Manual broom   d. Seesaw
- Which of the following levers is used to transfer force from one place to another? - .....  
a. Manual broom   b. Nutcracker   c. Scissors   d. Stapler
- Crowbar is considered a lever from ..... type. (Cairo 2016)  
a. first   b. second   c. third   d. (a) and (b)
- ..... increase the speed of the object that we inflict on. (Alex. 2011)  
a. Nutcrackers   b. Coal holders   c. Wheelbarrows   d. Hockey bats
- Which of the following levers is used to avoid dangers? - ..... (Menofia 2012)  
a. Coal holder   b. Scissors   c. Seesaw   d. Manual broom



## Lesson 1

12. The lever that has the fulcrum between the force and the resistance is .....  
(Fayoum 2019)  
a. first                      b. second                      c. third                      d. first and second
13.  ..... is one of the first class levers. (Cairo 2019)  
a. Nutcracker                      b. Sweet holder                      c. Scissors                      d. Manual broom
14.  The 1<sup>st</sup> class lever differs from the 2<sup>nd</sup> class lever in ..... (Alex. 2013)  
a. the absence of the effort force                      b. the presence of a fixed point  
c. the position of the fulcrum                      d. (a) and (b)
15. Seesaw is a first class lever because .....  
a. the effort force lies between the resistance force and the fulcrum  
b. the resistance force lies between the effort force and the fulcrum  
c. the fulcrum lies between the effort force and the resistance force  
d. there is no correct answer
16. All the following are second class levers except ..... (Beheira 2017)  
a. wheelbarrow                      b. sweet holder                      c. bottle opener                      d. nutcracker
17.  Which one of the following is a second class lever? – ..... (South Sinai 2016)  
a. Sweet holder                      b. Wheelbarrow                      c. Seesaw                      d. Hockey bat
18. .... is/are an example of the third class levers. (Kafr El- Skeikh 2019)  
a. Scissors                      b. Sweet holder                      c. Seesaw                      d. Nutcracker
19. Which of the following levers has the force between resistance and fulcrum? – ..... (Giza 2019)  
a. Scissors                      b. Nutcracker                      c. Sweet holder                      d. Seesaw
20.  All the following are third class levers except ..... (Fayoum 2017)  
a. wheelbarrow                      b. fishing tool                      c. sweet holder                      d. manual broom
21. Sweet holder is a ..... class lever.  
a. first                      b. second                      c. third                      d. no correct answers
22. .... have the effort force between the resistance force and the fulcrum. (Menofia 2013)  
a. 3<sup>rd</sup> class levers                      b. 2<sup>nd</sup> class levers  
c. 4<sup>th</sup> class levers                      d. (b) and (c)
23. .... have the resistance force between the effort force and the fulcrum. (Cairo 2017)  
a. Third class levers                      b. First class levers  
c. Second class levers                      d. (a), (b) and (c)



24.  Which of the following is a 2<sup>nd</sup> class lever? - .....  
 a. Manual broom    b. Tweezers    c. Scissors    d. Bottle opener
25.  ..... is/are a lever of the 3<sup>rd</sup> class.  
 a. Sweet holder    b. Scissors    c. Nutcracker    d. Nail clipper
26.  The effort force is between the resistance force and the fulcrum in .....  
 (Fayoum 2013)  
 a. nutcracker    b. scissors    c. sweet holder    d. crowbar
27. All the following are of the 1<sup>st</sup> class levers except .....  
 a. wheelbarrow    b. scissors    c. seesaw    d. suction pump

## 2 Complete the following sentences:

- Simple machines that help man to perform heavy tasks more easily are called .....
-  ..... is considered one of the first simple machines which was invented in the past.
- The lever is a rigid bar that rotates around a fixed point called ..... and is also affected by ..... and ..... (Suez 2012)
-  The lever is a ..... that rotates around a fixed point called the fulcrum. (Suez 2013)
- The scientist ..... is the first who invented levers to facilitate tasks. (Port Said 2018)
- Among the factors that make levers important are ..... and .....
- Some levers allow increasing the speed of objects we inflict on as in ..... (Menofia 2017)
- Crowbar saves effort by using ..... force to move big .....
- The ..... consists of ....., fulcrum and .....
- In the first class levers, the ..... lies between ..... and ..... (Aswan 2016)
- Among the types of levers are ..... and .....
- Manual broom is an example of lever that is used to increase ....., while hockey bat is an example of lever that is used to increase the ..... (Assiut 2016)
- In the third class levers, the ..... lies between ..... and .....
- ..... that are very accurate are used to fix watches.
-  In the first class levers, the fulcrum is found between ..... and ..... (Sohag 2017)
- ..... is the most popular type of levers in our daily life.
- From the examples of levers that are used to avoid dangers is ..... (Gharbia 2017)
-  The nutcracker is an example of the ..... levers. (Port Said 2019)



## Lesson 1

19. Seesaw is ....., while sweet holder is ..... (Sohag 2015)
20. The scissors are considered a ..... class lever, while a manual broom is a ..... class lever. (Cairo 2019)
21. 🍰 In the second class levers, the resistance force is found between ..... and .....
22. The crowbar is a ..... class lever, while ..... is a third class lever. (Red Sea 2012)
23. In ..... class lever, the effort force is found between the fulcrum and the resistance force.

### 3 Put (✓) in front of the right statement and (X) in front of the wrong one:

1. Levers were first described by the Greek scientist Archimedes. (Kaf El-Sheikh 2012) ( )
2. From the functions of levers is to decrease speed. (Cairo 2017) ( )
3. Manual broom is used in increasing distance and transferring force. ( )
4. 🍰 In the first class levers, the resistance force is between the effort force and the fulcrum. (Fayoum 2012) ( )
5. Nutcracker is a second class lever because the effort force lies between the resistance force and the fulcrum. ( )
6. Fish hook is a first class lever. (Ismailia 2017) ( )
7. Wheelbarrow, sweet holder and fishing tool are of the third class levers. ( )
8. 🍰 In the second class levers, the resistance force lies between the effort force and the fulcrum. (Ismailia 2017) ( )
9. 🍰 The fulcrum of any lever is always between the effort force and the resistance force. (Qena 2016) ( )
10. 🍰 The fulcrum in scissors lies between the effort force and the resistance force. (Assuit 2019) ( )
11. 🍰 Nutcracker is considered a first class lever. (Matrouh 2013) ( )
12. Wheelbarrow is an example of the first class levers. (Sohag 2019) ( )
13. Levers make tasks easier. (Assiut 2012) ( )
14. Scissors are of the third class levers. ( )
15. 🍰 Crowbar is a first class lever. (Sohag 2014) ( )
16. Coal holder is used to avoid dangers. (Dakahlia 2019) ( )



17. In order to determine the type of the lever, you have to determine the location of each of the effort force and the resistance force with respect to the fulcrum. ( )
18. 🍰 The third class levers have the fulcrum between the effort force and the resistance force. (Cairo 2012) ( )
19. Soda water opener is a second class lever, while fishing tool is a first class lever. (Cairo 2019) ( )

#### 4 Write the scientific term for each of the following:

- The first scientist who describes the levers in 260 BC. (Giza 2018) (.....)
- A rigid bar rotates on a fixed point, and is affected by a force resistance. (Port Said 2019) (.....)
- The fixed point on which the lever rotates. (Giza 2019) (.....)
- A lever used in increasing the force. (.....)
- A lever used in increasing the distance and transferring the force. (.....)
- A lever used in increasing the speed. (.....)
- A lever used to avoid the dangers and the heat. (.....)
- A force that results from the body that we want to move. (.....)
- A force that is exerted by a person to equilibrate the resistance force. (.....)
- The most popular type of levers in our daily life. (.....)
- Levers where the fulcrum lies between the effort force and the resistance force. (.....)
- Levers in which the resistance force lies between the effort force and the fulcrum. (Cairo 2019) (.....)
- Levers that have the force between the resistance and the fixed point. (Cairo 2019) (.....)

#### 5 Correct the underlined words:

- Newton was the first scientist who describes the levers. (Cairo 2019) (.....)
- The human arm is from the third class levers. (Fayoum 2017) (.....)
- A lever must have effort force, resistance force and a heavy load. (.....)
- Resistance force lies between the effort force and the fulcrum in the third class lever. (.....)



## Lesson 1

5. The coal holder is used in increasing force. (.....)
6. Seesaw, scissors and bottle opener are examples of the first class levers. (Ismailia 2011) (.....)
7. Wheelbarrow is a third class lever. (Beni Suef 2012) (.....)
8. Manual broom works on increasing force. (.....)
9. The fulcrum lies between the effort force and the resistance force in the third class levers. (Suez 2012) (.....)
10. Bottle opener is a third class lever. (.....)
11. In the first class levers, the resistance force lies between the effort force and the fulcrum. (Damietta 2011) (.....)
12. Third class levers are the most popular type in our daily life. (.....)
13. Scissors and bottle openers are examples of the third class levers. (.....)
14. In the second class levers, the effort force lies between the fulcrum and the resistance force. (Beni Suef 2012) (.....)
15. 🥵 Nutcracker is of the first class levers. (Alex. 2017) (.....)
16. Some of the levers allow the increase in the speed of objects we inflict on as in manual broom. (Alex. 2012) (.....)

**6 Match the sentences in column (A) with the correct sentences in column (B):** (Minia 2014)

1.	(A)	(B)
1.	Seesaw	a. the fulcrum
2.	Fishing tool	b. a first class lever
3.	The fixed point on which a rigid bar rotates	c. the resistance
4.	Nutcracker	d. a lever
5.	A rigid bar that rotates around a fixed point called (fulcrum) and is also affected by the effort force and the resistance force	e. a second class lever
		f. a third class lever

1. .... 2. .... 3. .... 4. .... 5. ....




2.

(A)	(B)
1. First class levers	a. Fishing tool, manual broom and tweezers.
2. Second class levers	b. It is the most famous kind of levers.
3. Third class levers	c. Wheelbarrow, bottle opener and nutcracker.
4. The levers	d. It is a fixed point that a rigid bar rotates on.
5. The effort force	e. It is a rigid bar that rotates around a fixed point and is affected by a force and a resistance.
6. The resistance force	f. It lies in the middle in the third class levers.
7. The fulcrum	g. It lies in the middle in the second class levers.

1. .... 2. .... 3. .... 4. ....  
5. .... 6. .... 7. ....

### 7 Give a reason for each of the following:

- Crowbar is a lever. (Alex. 2019)  
.....
- Seesaw is a first class lever.  
.....
- Sweet holder is a third class lever.  
.....
-  Levers have great importance in our life. (Assuit 2011)  
.....
- Wheelbarrow is a second class lever.  
.....
- Doctors and watchmakers use tweezers as a lever.  
.....
- Nutcracker is considered an increasing force lever.  
.....
- Manual broom is considered an increasing distance lever.  
.....
- Bottle opener and stapler are of second class levers. (Giza 2018)  
.....

(27)



## Lesson 1

## 8 Define each of the following:

1. Fulcrum.

(Alex. 2012)

2. Lever.

(Damietta 2017)

3. First class levers.

4. Second class levers.

5. Third class levers.

## 9 Mention one function for each of the following:

1. Levers.

(Sohag 2017)

2. Coal holder.

3. Wheelbarrow.

4. Crowbar.

5. Manual broom.

6. Hockey bat.

(Sharkia 2017)

## 10 Circle the odd word and then express the other words using a scientific term:

1. Seesaw - crowbar - scissors - nutcracker.

2. Wheelbarrow - nutcracker - pliers - bottle opener.

3. Hockey bat - coal holder - fish hook - crowbar.



## 11 Mention four functions of the levers.

(Beheira 2018)

.....

.....

## 12 Mention one example of a lever used in:

1. avoiding dangers.

.....

2. transferring force from one place to another.

.....

3. catching things accurately.

.....

4. increasing speed.

.....

5. saving effort.

.....

6. increasing force.

.....

7. increasing distance.

.....

## 13 🍰 Classify the following machines according to the type of lever: (Assuit 2017)



(1) .....



(2) .....



(3) .....



(4) .....



(5) .....



(6) .....



## Lesson 1

## 14 🍰 The maze of levers:

Mona is trying to pass through the levers to reach the ice cream at the end of the maze. But, she has to pass only through the squares that have first class levers, mention the way that she must pass through.



15 🍰 Compare between the three types of levers according to the location of fulcrum, resistance force and effort force giving examples for each type.

(Giza 2013)

First class levers	Second class levers	Third class levers
.....	.....	.....
.....	.....	.....

16 🍰 What would happen if we didn't have levers?

.....

.....

.....



# TIMSS

Like Questions

on Lesson

Answer Guide P. 3

## 1. Examine the following figure:

Mohamed is trying to move a large stone in the garden of his house.

He used a rigid bar as shown.

a. The straight rigid bar he used is called

a .....

b. He used the rigid bar for a certain benefit which is .....

c. In the figure:

1. Determine the position of the fulcrum (O).

2. Determine the position of the effort force (F).

3. Determine the position of the resistance force (R).

d. What is the type of the lever he used? Explain your answer.

.....

## 2. Some students have ideas about properties of types of levers:

Shaimaa



Lever that have the fulcrum (O) between the effort force (F) and the resistance force (R).

Doaa



Lever that have the effort force (F) between the resistance force (R) and the fulcrum (O).

Mariam



Such as: seesaw, suction pump, crowbar and balance.

a. Which students are talking about the first class levers?

.....

b. Which students are talking about the second class levers?

.....



## GEM

## Exercises on Lesson

2

Answer Guide P. 4

## 1 Choose the correct answer:

- The factors that determine the values of the effort force and the resistance force in a lever are .....
  - the arm of the force
  - the arm of the resistance
  - the position of the fulcrum
  - (a) and (b)
- The law of levers states that ..... (Cairo 2014)
  - Effort force + its arm = resistance force + its arm
  - Effort force  $\times$  its arm = resistance force  $\div$  its arm
  - Effort force  $\times$  its arm = resistance force  $\times$  its arm
  - Effort force - its arm = resistance force  $\times$  its arm
- When the arm of force is longer than the arm of resistance, the effort force is ..... the resistance force.
  - larger than
  - smaller than
  - double
  - equal to
- The effort force and the resistance force are measured in .....
  - Newton
  - Hertz
  - meter
  - cubic centimeter
- The distance between the effort force and the fulcrum is called .....
  - the arm of the force
  - the arm of resistance
  - the arm of the lever
  - the fulcrum
- The distance between the resistance force and the fulcrum is called .....
  - the arm of resistance
  - the arm of force
  - the arm of the lever
  - the fulcrum
- The lever saves effort when ..... (Gharbia 2017)
  - the arm of force is less than the arm of resistance
  - the arm of force is equal to the arm of resistance
  - resistance equals force
  - the arm of force is longer than the arm of resistance
- If an effort force of value 10 Newton at 10 cm distance from a fulcrum of a lever inflicts an amount of resistance at 5 cm from the fulcrum of the lever, then the resistance force will be .....
  - 10 Newton
  - 20 Newton
  - 5 Newton
  - 100 Newton



## Lesson 2



9. An effort force of value 100 Newton is at one end of a lever and the arm of force = 10 cm if it is affected by a resistance of 20 Newton, then the arm of resistance will be .....  
 a. 20 cm      b. 10 cm      c. 50 cm      d. 100 cm
10. An effort force of 10 Newton at a distance of 10 cm from the fulcrum. If you place a resistance force of 20 Newton on the other end of the lever, then the length of the arm of resistance is .....  
 a. 20 cm      b. 10 cm      c. 5 cm      d. 25
11. 🍰 Which of the following levers saves (conserves) effort? – ..... (Giza 2019)  
 a. Scissors      b. Nutcracker      c. Fishing rod      d. Sweet holder
12. 🍰 The force arm is sometimes equal to the resistance arm in the ..... class levers. (Port Said 2019)  
 a. first      b. second      c. third      d. first and third
13. Which of the following levers doesn't save effort? – ..... (Giza 2019)  
 a. Fishing tool      b. Nutcracker      c. Bottle opener      d. Wheelbarrow
14. Second class levers always save effort because the length of the arm force is ..... the length of the arm of resistance.  
 a. equal to      b. longer than      c. shorter than      d. no correct answers
15. The type of levers which always has a mechanical benefit is the .....  
 a. 1<sup>st</sup> class levers      b. 2<sup>nd</sup> class levers      c. 3<sup>rd</sup> class levers      d. no correct answers
16. The type of lever which always doesn't save effort is the ..... (Sharkia 2014)  
 a. first class lever      b. third class lever  
 c. second class lever      d. fourth class lever
17. 🍰 When the lever is balanced, .....  
 a. effort force/arm of resistance = resistance force/arm of force  
 b. effort force/arm of force = resistance force × arm of resistance  
 c. effort force × arm of force = resistance force × arm of resistance  
 d. effort force × arm of resistance = resistance force × arm of force

## 2 Complete the following sentences:

1. .... is the measuring unit of effort force, but ..... is the measuring unit of its arm. (Qalubia 2018)
2. 🍰 The effort force × its arm = ..... × ..... (Cairo 2019)
3. The distance between the force and the fulcrum is known as ..... where the distance between the fulcrum and the resistance is called ..... (Port Said 2017)
4. The force arm is the distance between ..... and .....



## Unit 1





5. The factors that determine the values of effort force and resistance effort force are ..... and .....
6.  If the arm of force is shorter than the arm of resistance, then the effort force is ..... than resistance force. (Sohag 2014)
7. If the arm of resistance is shorter than the arm of force, then the resistance force is ..... than the effort force.
8. Effort force is measured in ..... unit.
9. Resistance arm is measured in ..... unit.
10. First class levers save effort and the value of resistance force is ..... than the value of the effort force.
11. When the arm of force is equal to the arm of resistance, then ..... is equal to .....
12. If the ratio between the length of the arm of force and the length of the arm of resistance equals 10:1, then the ratio between effort force and resistance force = .....
13. When the resistance force equals 10 N, the resistance arm = 5 cm and the force arm = 2 cm, then the effort force equals .....
14. The lever conserves effort when ..... is longer than ..... arm. (Damietta 2017)
15. The lever doesn't conserve effort when ..... arm is shorter than ..... arm.
16.  The only type of the levers where the arm of force and the arm of resistance are equal is ..... (Assuit 2019)
17. Some levers allow the conservation of ..... by means of using small force to move heavy loads, like the crowbar. (Alex. 2011)
18. If the arm of force is shorter than the arm of resistance, then the ..... is larger than ..... (Sharkia 2017)
19. .... class levers always save effort, while .... class levers never save effort.
20. The second class levers always save effort because the ..... is longer than the ..... (Sharkia 2014)
21. In hockey bat, the effort force arm is ..... than the resistance force, while in soda water bottle opener, the effort force arm is ..... than the resistance arm.
22. The first class levers have mechanical benefit when ..... is longer than .....
23. Tweezers and coal holder have no mechanical benefits, because ..... is shorter than .....
24. When the lengths of the resistance arm and the effort arm equal 5 cm and the resistance = 2 Newton, then the effort force equals .....
25. Manual broom doesn't save effort because .....



## Lesson 2


26. Bottle opener has a mechanical benefit because ..... is longer than ..... .
27. When the effort force equals 40 Newton, resistance force is 20 Newton and effort force arm = 8 cm, then the resistance arm equals ..... .

**3 Put (✓) in front of the right statement and (X) in front of the wrong one, then correct it:**

1. The law of levers states that effort force x its arm = resistance force x its arm. ( )
2. The effort force is measured in kilogram. ( )
3.  The effort force x its arm = the resistance force x its arm. (Suez 2014) ( )
4.  When the resistance arm is longer than the effort arm, then the lever saves effort. (Giza 2013) ( )
5. Resistance arm is measured in centimeter. ( )
6. Force arm is the distance between the effort force and the fulcrum. ( )
7. When the force arm is longer than the resistance arm, then the lever has a mechanical benefit. ( )
8. When the effort force equals the resistance force, then the force arm is shorter than the resistance arm. ( )
9. When the value of the resistance force = 100 N, the effort force = 200 N and the force arm = 10 cm, then the resistance arm = 10 cm. ( )
10. Soda water bottle opener always conserves effort, while coal holder doesn't conserve effort. ( )
11. The lever saves effort if the arm of force is shorter than the arm of resistance. ( )
12. If the arm of force is shorter than the arm of resistance, then the effort force is less than the resistance force. (Dakahlia 2019) ( )
13. In the first class levers, there are three possibilities for the length of each of the arm of force and the arm of resistance. ( )
14. The second class levers are the type of levers where effort force is equal to resistance. ( )
15.  If the arm of the force is shorter than the arm of the resistance, then the lever conserves the effort. (Sohag 2019) ( )
16. Seesaw doesn't have a mechanical benefit because the force arm is longer than the resistance arm. ( )
17. Manual broom doesn't conserve effort. ( )
18. The second class levers always save effort. ( )
19.  The third class levers always save effort. (Qalubia 2014) ( )
20. In the 3<sup>rd</sup> class levers, the arm of force may be equal to the arm of resistance. (Dakahlia 2014) ( )



#### 4 Write the scientific term for each of the following:

1. The distance between the effort force and the fulcrum. (Cairo 2016) (.....)
2. The distance between the resistance force and the fulcrum. (Beheira 2019) (.....)
3. The product of force multiplied by its arm equals the product of resistance multiplied by its arm. (.....)
4. It's the measuring unit of resistance and force effort. (Dakahlia 2019) (.....)
5. The type of levers that always save effort. (Sohag 2019) (.....)
6. The type of levers that never save effort. (.....)
7. The type of levers that sometimes save effort. (Cairo 2019) (.....)
8. The lever which is used to carry out the job accurately. (.....)
9.  Effort force x its arm = resistance force x its arm. (.....)
10. The type of levers, where the effort force is always smaller than the resistance force. (.....)
11. The type of levers, where the effort force is always larger than the resistance force. (.....)

#### 5 Correct the underlined words:

1. The first class levers save effort if the effort force is equal to the resistance. (.....)
2. The first class levers always save effort. (Gharbia 2016) (.....)
3. The second class levers don't save effort. (Cairo 2019) (.....)
4. Coal holder is an effort-saving lever. (.....)
5. The arm of force is always longer than the arm of resistance in the first class levers. (.....)
6. The distance between the effort force and the fulcrum is called the arm resistance. (.....)
7. The first class levers never save effort. (.....)
8. The arm of the resistance is the distance between the resistance and force. (.....)
9. When the arm of force equals the arm of resistance, then the effort force is larger than the resistance force. (.....)



## Lesson 2

10. Although crowbar is a third class lever, it conserves effort.

(Gharbia 2017) (.....)

11. The third class levers always save effort.

(Gharbia 2016) (.....)

12. The first class levers always have no mechanical benefits. (Minia 2014) (.....)

13. If the force arm is smaller than the resistance arm, the lever saves effort.

(Port Said 2019) (.....)

**6**  Match the sentences in column (A) with the correct sentences in column (B):  
(Port Said 2019)


(A)	(B)
1. The first class levers	a. levers that always save effort.
2. The second class levers	b. levers that never save effort.
3. The third class levers	c. levers that sometimes save effort.
4. The lever	d. is a fixed point on which the rigid bar rotates.
5. The fulcrum	e. is a rigid bar that moves around a fixed point and is affected by effort force and resistance force.

1. .... 2. .... 3. .... 4. .... 5. ....


**7** Give a reason for each of the following:

1. Crowbar conserves effort.

.....

2.  The effort force doesn't equal the resistance force in the 2<sup>nd</sup> class levers. (Luxor 2014)

.....

3.  Sometimes the 1<sup>st</sup> class levers save effort.

.....

4.  In the second class levers, the effort force is always less than the resistance force.

.....

5. Second class levers always conserve the effort. (Kafr El-Sheikh 2019)

.....

6. The 3<sup>rd</sup> class levers are very important although they don't conserve effort.

(Damietta 2019)

.....



## 8 What happens when ...?

1. The arm of force is longer than the arm of resistance. (Menofia 2017)
2. The arm of force is shorter than the arm of resistance. (Giza 2019)
3. The arm of force is equal to the arm of resistance. (Alex. 2019)
4. The length of the effort arm is half the length of the resistance arm for a lever. (Damietta 2017)
5. The effort force is larger than the resistance force. (Dakahlia 2014)

## 9 Define each of the following:

1. The arm of force.
2. The arm of resistance.
3. The law of levers.

## 10 From the shown table, find:

Force (Newton)	Arm of force (cm)	Resistance (Newton)	Arm of resistance (cm)
X	5	1	10
5	8	2	Y
50	10	Z	10
100	N	25	8

- a. The value of (X)
- b. The value of (Y)
- c. The value of (Z)
- d. The value of (N)



## Lesson 2

11 Compare between the three types of levers using the following table:

P.O.C	First class levers	Second class levers	Third class levers
Definition	.....	.....	.....
Importance	.....	.....	.....
Conservation of effort	.....	.....	.....
Examples	.....	.....	.....

12 Complete the following:

## Law of levers

States that

$$\text{Effort force} \times \dots = \dots \times \dots$$

## Determining the mechanical purposes of levers

## First class levers

The fulcrum lies between the force of effort and the force of resistance.



## Second class levers

.....

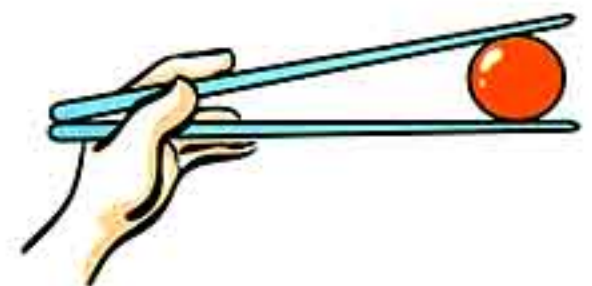
.....



## Third class levers

.....

.....



always conserve effort.



## 13 Problems:

1. A second class lever has an effort force of 200 Newton and the length of its force arm is 50 cm, **calculate** the length of the arm of resistance, if it is affected by a resistance force of 100 Newton.

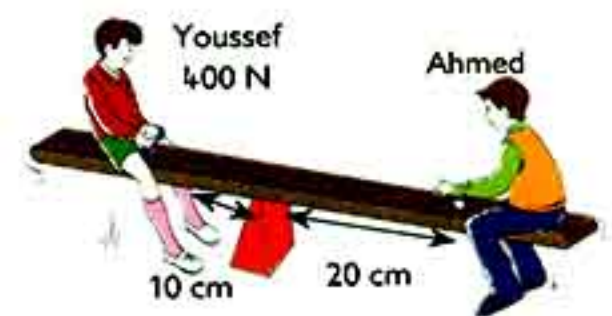
.....


.....

2. In the opposite figure, the lever is balanced.  
**Calculate** Ahmed's weight.

.....

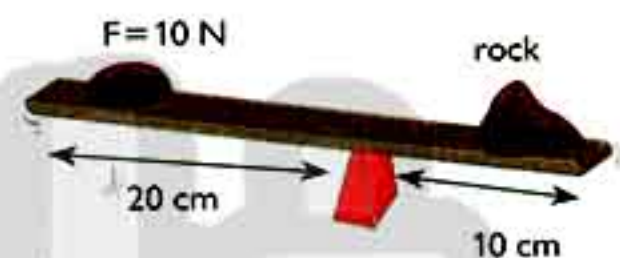
.....



3.  In the opposite figure, **calculate** the weight of the rock when the lever is balanced.  
Is this lever effort-saving? Why?

.....

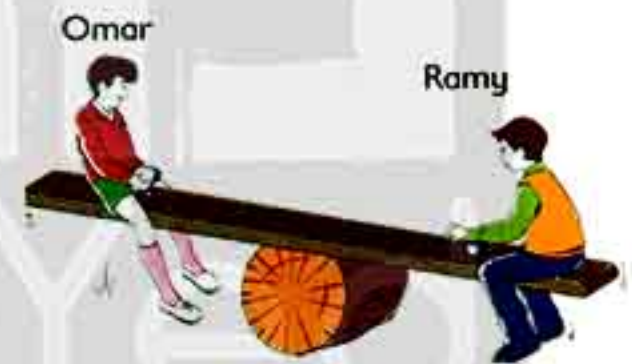
.....



4. The opposite figure illustrates a balanced lever.  
Omar's distance from the fulcrum is double Ramy's distance from the same fulcrum.  
**Which weight is heavier, Omar's or Ramy's? Why?**

.....

.....



5. In the opposite figure, a ruler of length 30 cm. A cylinder rubber was placed at the middle of the ruler, then a coin was placed at the mark zero:

- a. Where should you put another coin so that the ruler is balanced?
- .....
- b. What is the number of coins that should be placed at the mark 20 so that the ruler is balanced?
- .....



6. **Calculate** the length of the arm of force in a lever whose force value equals 400 N and the resistance value is 200 N; if you know that the arm of resistance equals 20 cm.  
**Does this lever conserve effort or not? Why?**

(Matrouh 2016)

.....


.....




## Lesson 2

7. A balanced lever has a resistance force of 40 Newton. The distance between the resistance force and the fulcrum is 4 cm. Calculate the value of the effort force that should be placed at the other end 10 cm away from the fulcrum. (Luxor 2016)

8. Calculate the length of the force arm in a lever if you know that the value of the force is 100 N, the resistance is 200 N and the length of the resistance is arm 20 cm. (Aswan 2016)

9.  The force affecting a second class lever equals 200 Newton and the length of its arm is 50 cm and has a resistance force of 1000 Newton. Calculate the length of the arm of the resistance. (Port Said 2014)

10.  The length of the force arm of a first class lever is 5 cm, and the length of the arm of the resistance is 15 cm. If the value of the resistance force is 300 Newton, then calculate the value of the effort force. (Qena 2016)


11. In the opposite figure, which illustrates a type of levers. Calculate the length where the weight number 2 is put to make the lever balanced. (Alex. 2018)



12. If the ratio between the length of the resistance arm and the length of the force arm is 5:1 and the value of resistance force is 5 Newton. Calculate the value of the effort force.

13. Habiba and Mohamed sat on the seesaw. Habiba affected the seesaw by a force of 50 Newton, and the distance between her and the fulcrum was 200 cm. Mohamed, on the other hand, affected the seesaw with a force of 60 Newton and the distance between him and Habiba was 150 cm. Find out if the seesaw was balanced or not. Why?



14.  **Determine by drawing:** the number of weights which must be placed at a distance of one hole from the fulcrum to make the lever balanced, where the distance between every two holes is 1 cm.



15. The force affecting a first class lever equals 500 N and the length of its arm is 10 cm. If the value of the resistance equals 200 N and the length of the resistance arm is 20 cm. Is this lever balanced? Why?

If the lever is not balanced, what is the length of the resistance arm required for keeping the balance?



Question  
Bank

Assess your skills & solve  
Interactive Tests after  
each unit.

Visit: [www.aladwaa.com](http://www.aladwaa.com)



# TIMSS

Like Questions

## 2

on Lesson

Answer Guide P. 6

### 1. Examine the opposite picture:

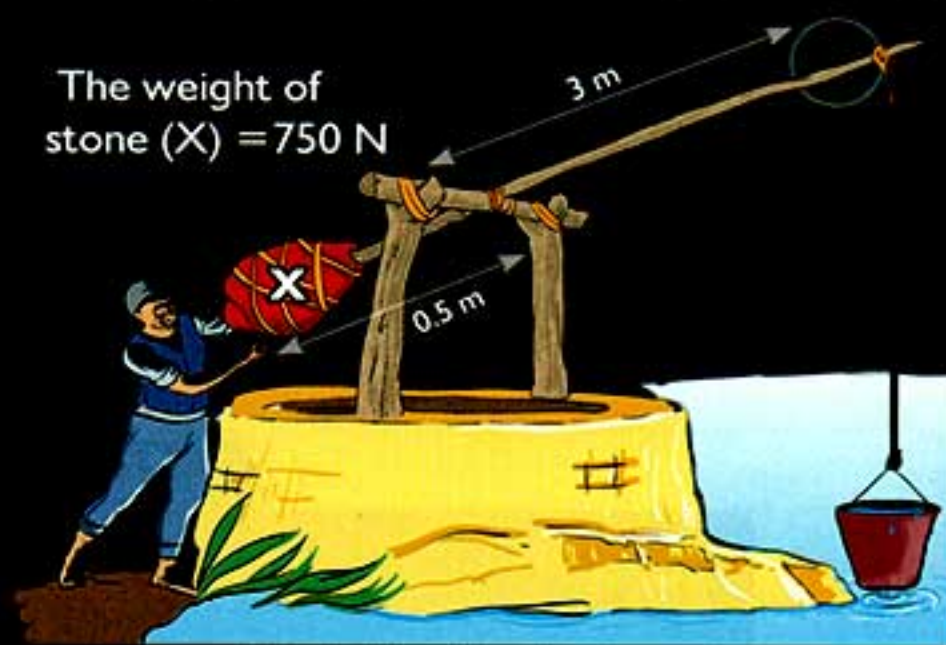
- Specify 3 first class levers in the picture  
.....
- What are the benefits of each lever you mentioned? .....
- Specify a second class level. Does it save effort? .....
- In the picture: Specify the fulcrum, the effort force and the resistance force for the man referred to by (X).
- If the man referred to by (X) is using a rigid bar with a length of (1.75 m) and exerting an effort force of (20 N) to move the large stone, and the effort arm is (1.5 m). Find the weight of the stone (Show your work).  
(Note: the weight of the stone is the resistance force). Does it save effort?



### 2. Examine the opposite picture:

This farmer is using the shadoof (very old tool) to get water from the canal, if the value of resistance is (200 N) at each time of getting water out, then:

- Find the effort required to lift water (show your work) .....
- Find the effort actually done by the farmer after using (X). .....
- Does the tool save effort? .....



The resistance value here is 200 N



# Unit 1 Force and Motion

Lesson 1

## Types of levers

Answer Guide P. 15

### Worksheet 1

#### 1 A) Write the scientific term for each of the following:

1. A rigid bar that rotates on a fixed point and is affected by the force and the resistance. (.....)
2. A fixed point on which a rigid bar rotates. (.....)
3. The force that is exerted by a person to overcome the resistance. (.....)
4. The force which results from the weight of an object we want to move. (.....)

#### B) Give a reason for each of the following:

1. Crowbar is considered an increasing force lever.  
.....
2. Doctors and watchmakers use tweezers as a lever.  
.....

#### 2 A) Complete the following sentences:

1. The scientist ..... was the first who invented levers to facilitate tasks.
2. The simple machine that is composed of a bar and helps to perform tasks easily is called .....
3. .... and ..... are examples of levers.
4. .... and ..... are from the benefits of levers.
5. The lever consists of ..... and .....

#### B) Put (✓) or (X) in front of each sentence:

1. Levers are the most common, simple machines. ( )
2. The rigid bar of a lever is affected by three forces. ( )
3. From the functions of levers is to decrease speed. ( )





## Worksheets &amp; Exams

## 3 A) Determine the function of each of the following:

1. Ice holder

2. Tweezers

3. Hockey bat

4. Nutcracker

5. Crowbar

6. Manual broom

## B) Correct the underlined words:

1. Hockey bat is an example of increasing distance levers. (.....)
2. Some of the levers allow the increase in the speed of the objects that we inflict on as in the manual broom. (.....)
3. Tweezers and a hockey bat save the exerted effort. (.....)
4. Crowbar is an example of using levers to avoid dangers. (.....)

## 4 A) Choose the correct answer:

1. The force that is exerted to equilibrate the resistance is called .....  
a. fulcrum                      b. effort                      c. friction
2. Which of the following levers is used to transfer force from one place to another?  
.....  
a. Manual broom.              b. Scissors.              c. Stapler.
3. All the following are among functions of levers except .....  
a. increasing speed              b. increasing size              c. increasing force

## B) What would happen if we did not have levers?

.....

.....

.....

.....

.....

.....



## Worksheet 2

## 1 A) Choose the correct answer:

1. Nutcracker is a ..... class lever.

(first – second – third)

2. Tweezers are used to .....

(increase force – pick up minute objects – increase speed)

3. Levers were first described by .....

(Newton – Einstein – Archimedes)

4. To move a heavy stone, we use .....

(wheelbarrow – crowbar – pliers)

## B) Give a reason for each of the following:

1. Nail clippers are a first class lever.

.....

2. Wheelbarrow is a second class lever.

.....

## 2 A) Complete the following sentences:

1. In the first class levers, the ..... lies between ..... and .....

2. .... is the most popular type of levers in our daily life.

3. Crowbar is a ..... class lever, while ..... is a third class lever.

4. From the examples of levers that are used to avoid dangers is .....

## B) Mention four functions of levers.

.....

.....

.....

.....





## Worksheets &amp; Exams

## 3 A) Correct the underlined words:

1. Cool holder is a first class lever. (.....)
2. The fulcrum lies between the effort force and the resistance force in the third class lever. (.....)
3. Manual broom is one of the second class levers. (.....)
4. The fulcrum is always between the effort force and the resistance force. (.....)

## B) Identify the type of the lever.



a. ....



b. ....



c. ....



d. ....

## 4 A) Put (✓) or (X) in front of each sentence:

1. The fulcrum in scissors lies between the effort force and the resistance force. ( )
2. A lever is affected by effort force only. ( )
3. Manual broom is used in increasing distance and transferring force. ( )
4. Levers are not useful. ( )

## B) What is meant by ...?

1. The first class levers.

.....

2. The second class levers.

.....

3. The third class levers.

.....



## 2

## Law of levers

Answer Guide P. 15

## Worksheet 3

## 1 A) Complete the following sentences:

1. Force  $\times$  its arm = .....  $\times$  .....
2. If the arm of force is shorter than the arm of resistance, then the effort force is ..... than the resistance force.
3. .... is the distance between the effort force and the fulcrum.
4. .... is the distance between the resistance force and the fulcrum.
5. The effort force and the resistance are measured in .....

## B) Put (✓) or (X) in front of each sentence:

1. When the effort arm is longer than the resistance arm, the lever saves effort. ( )
2. The resistance arm is measured in meter. ( )

## 2 A) Write the scientific term for each of the following:

1. Levers that always save effort. (.....)
2. The product of effort force multiplied by its arm equals the product of resistance multiplied by its arm. (.....)
3. A lever is used to carry out jobs accurately. (.....)

## B) What happens in the following cases?

1. The arm of force is longer than the arm of resistance.  
.....  
.....
2. The arm of force is shorter than the arm of resistance.  
.....  
.....



## Worksheets &amp; Exams

## 3 A) Give a reason for each of the following:

1. In the second class levers, the effort force is always less than the resistance force.

.....

2. Sometimes the first class levers save effort.

.....

3. The third class levers are very important although they don't conserve effort.

.....

## B) Match the sentences in column (A) with the correct sentences in column (B):

(A)	(B)
1. The first class levers	a. levers that always save effort.
2. The second class levers	b. levers that never save effort.
3. The third class levers	c. levers that sometimes save effort.
4. The lever	d. is a fixed point on which the rigid bar rotates.
5. The fulcrum	e. is a rigid bar that moves around a fixed point and is affected by effort force and resistance force.

1. .... 2. .... 3. .... 4. .... 5. ....

## 4 A) A first class lever is affected by a force of 500 Newton with an arm length of 20 cm and has a resistance of 200 Newton. Calculate the length of the arm of resistance.

.....

.....

.....

## B) A force of 5000 Newton is affecting a lever where the arm of force is 20 m, the resistance is 10000 Newton and the arm of resistance is 5 m. Determine if the lever is balanced or not.

.....

.....

.....



## Worksheet 4

## 1 A) Complete the following sentences:

1. If the effort force equals 20 N, the resistance is 8 N and the effort arm = 4 cm, then the resistance arm equals .....
2. A lever saves effort when the arm of ..... is longer than the arm of .....
3. The third class levers ..... effort, while the second class levers ..... effort.

## B) Write the scientific term of each of the following:

1. The distance between the resistance force and the fulcrum. (.....)
2. They are simple machines that always save effort. (.....)
3. Levers that sometimes save effort. (.....)

## 2 A) A second class lever is affected by a force of 100 Newton, with a force arm of 40 cm. The lever has also a resistance of 200 Newton. Calculate the length of the resistance arm.

.....

.....

## B) Compare between the three types of levers.

P.O.C	First class levers	Second class levers	Third class levers
Definition			
Locations of F, O, R			
Effort force arm and resistance arm			
Saving effort			
Benefits			
Examples			



## Worksheets &amp; Exams

- 3 A) A balanced lever is affected by a resistance that equals 30 Newton with an arm of length 2 cm. Calculate the value of the force needed of the other end of a distance 3 cm from the fulcrum.**
- .....
- .....

**B) What is meant by ...?**

1. A lever is an effort-saving machine.
- .....

2. A lever is not an effort-saving machine.
- .....

- 4 A) Give a reason for each of the following:**

1. Some of the first class levers conserve effort but others do not.
- .....

2. Wheelbarrow has a mechanical benefit.
- .....

3. Coal holder does not have a mechanical benefit.
- .....

**B) Match column (A) with what suits in column (B):**

(A)	(B)
1. First class levers	a) always conserve effort.
2. Second class levers	b) sometimes conserve effort.
3. Third class levers	c) never conserve effort.

1. ....

2. ....

3. ....



# School BOOK Exercises

on Unit 1

Answer Guide P. 16

## 1 Match column (A) with its correspondence in column (B):

	Column (A)
1	First class levers
2	Second class levers
3	Third class levers
4	The levers
5	The force
6	The resistance
7	The fulcrum

	Column (B)
a	Levers that always conserve the effort.
b	Levers that not conserve the effort.
c	Levers that sometimes conserve the effort.
d	A fixed point that a rigid bar sits on.
e	A rigid bar rotates around a fixed point, and is affected by a force and a fixed resistance.

## 2 Put (✓) or (X) in front of each of the following sentences, and correct the false ones:

1. The first class levers have the resistance between the force and the fulcrum. ( )
2. The second class levers have the force between the resistance and the fulcrum. ( )
3. The third class levers have the fulcrum between the force and the resistance. ( )
4. The crowbar is an example of the first class levers. ( )
5. If the arm of the force is smaller than the arm of the resistance, then the lever conserves the effort. ( )

## 3 Complete the following sentence:

1. The nutcracker is an example of the ..... levers.
2. The manual broom is an example of the ..... levers.
3. The scissors are an example of the ..... levers.
4. The force  $\times$  its arm = .....  $\times$  .....
5. The type of the levers where the arm of the force and the arm of resistance are equal is .....



## Worksheets &amp; Exams

4 Compare between the three types of levers using the following table:

Points of comparison	First class levers	Second class levers	Third class levers
Definition			
Conservation of effort			
Examples			

5 Classify the following items according to the type of lever:



a. ....



b. ....



c. ....



d. ....



e. ....



f. ....

6 The force affecting a second class lever equals 200 Newton and the length of its arm is 50 cm and has a resistance with a value of 100 Newton; calculate the value of the arm of the resistance.

.....  
 .....

7 The arm length of a third class lever is 5 cm, and the length of the arm of the resistance is 15 cm. If the resistance has a value of 300 Newton, calculate the value of the affecting force.

.....  
 .....





GEM

## General Tests on Unit

1

Answer Guide P. 17

(Total mark: 20)

## Test 1

## 1 A) Put (✓) or (X) in front of the following sentences:

(5 marks)

1. The force lies between the resistance and the fulcrum in the first class levers. ( )
2. The resistance lies between the force and the fulcrum in the second class levers. ( )
3. Crowbar is a first class lever. ( )
4. A lever saves efforts when the arm of the force is longer than the arm of the resistance. ( )
5. The fulcrum lies between the force and the resistance in the third class levers. ( )
6. The lever balances when the product of "effort force x its arm" is equal to the product of "resistance force x its arm". ( )

## B) Give a reason for each of the following:

1. Levers are very important in our daily life.

.....

.....

.....

2. Manual broom doesn't have a mechanical benefit.

.....

.....

.....

## 2 A) Complete the following sentences:

(5 marks)

1. The only type of levers where the arm of force and the arm of resistance are equal is .....
2. Scissors are from the ..... class levers.
3. The force arm is the distance between ..... and .....



GEM / Science / Primary 6

13



هذا العمل خاص بموقع ذاكرولي التعليمي ولا يسمح بتداوله على مواقع أخرى



## Worksheets &amp; Exams

**B) A first class lever is affected by 10 Newton force with an arm of 10 cm length and a resistance of 20 Newton.**

1. Calculate the length of the arm of resistance.

.....  
 .....

2. Does the lever save effort? Why?

.....  
 .....

**3 A) What happens when ...?**

(5 marks)

1. The effort force is less than the resistance force.

.....

2. The effort force is equal to the resistance force.

.....

**B) Write the scientific term:**

1. The type of levers, where the effort force is always smaller than the resistance force.

(.....)

2. The lever which provides accuracy in performance.

(.....)

3. The most popular type of levers in our daily life.

(.....)

**4 A) Correct the underlined words:**

(5 marks)

1. Bottle opener is an example of the third class levers.

2. The human arm is from the second class levers.

3. The first class levers always have no mechanical benefits.

4. Coal holder is an effort-saving lever.

**B) A third class lever with a force arm of 0.5 meter length, and a resistance arm of 15 cm length. If the resistance equals 200 Newton, calculate the affecting force on the lever.**

.....  
 .....



(Total mark: 20)

## Test 2

## 1 A) Write the scientific term for each of the following:

(5 marks)

1. The type of levers that sometimes save effort. (.....)
2. The force that is exerted by a person to equilibrate the resistance force. (.....)
3. A lever where the fulcrum lies between the force and the resistance. (.....)
4. The distance between the resistance force and fulcrum. (.....)

## B) Give a reason for each of the following:

1. The second class levers always save effort.

.....

2. The third class levers don't save effort.

.....

## C) The length of the force arm of a first class lever is 5 cm and the length of the arm of resistance is 20 cm. If the resistance has a value of 200 Newton, calculate the value of the affecting force.

## 2 A) Complete the following sentences:

(5 marks)

1. Some levers allow increasing the speed of objects we inflict on as in .....
2. If the force arm is longer than the resistance arm, then the force is ..... than resistance.
3. The ..... class levers are the levers where the force arm can be equal to the resistance arm.
4. Balance and seesaw are considered examples of .....

## B) Determine which of the following levers saves effort and why:



1. ....

2. ....

3. ....



## Worksheets &amp; Exams

## 3 A) Choose the correct answer:

(5 marks)

- The lever that has the fulcrum between the force and resistance is .....
  - wheelbarrow
  - soda water opener
  - seesaw
  - ice holder
- All levers and machines .....
  - are made of the same substances
  - have a fixed point called the fulcrum
  - are similar in shape and size
  - do not have specific functions
- All the following are levers that save effort except the .....
  - crowbar
  - nutcracker
  - wheelbarrow
  - ice holder
- The lever saves effort when .....
  - the arm of force = the arm of resistance
  - the arm of force is longer than the arm of resistance
  - the arm of force is shorter than the arm of resistance
  - force = resistance

## B) What is meant by ...?

1. Lever.

2. The law of levers.

## 4 A) Put (✓) or (X) in front of each sentence:

(5 marks)

- The fulcrum of any lever is always between the effort force and the resistance force. ( )
- The third class levers never save effort. ( )
- Effort force is measured in kilogram. ( )

## B) What happens if ...?

1. The force arm is shorter than the resistance arm.

2. We don't have levers.